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SUMMARY OF RECENT ABSTRACTS *

II. YELLOW FEVER

General

The authoritative book on yellow fever by STRODE and his colleagues is reviewed on p. 337. The reviewer, the late Dr. G. M. Findlay, wrote " It is perhaps not too much to suggest that this book will remain a monument for all time ".

Epidemiology : Animal hosts : Transmission

KUMM (p. 855) notes that records of yellow fever in Africa and S. America show periodicity, with intervals averaging 6 years.

In an investigation of the susceptibility to yellow fever of wild animals (other than primates) in Uganda, DICK (p. 503) found hedgehogs highly susceptible and the genet moderately susceptible ; these animals could serve as sources of infection for mosquitoes. Other animals were either negative after inoculation, or circulated a trace of the virus for a very short time.

Since it was known that in the Uganda forest area the redtail monkey shows the highest immune rate, higher than the grivet which is mainly terrestrial by day, BUXTON (p. 1110) studied the redtail in its forest habitat, for information which might be useful in relation to the epidemiology of yellow fever. Some details of this work are set out in the original abstract, which should be read in full.

An account of observations made in Uganda during 10 years is given by HADDOW *et al.* (p. 260), who examined the sera of 1,069 wild monkeys of 16 species, finding protective bodies in 40 per cent. The highest rates occurred in the inhabited area of Bwamba forest and some other places. The observations support the view that in Uganda yellow fever is essentially a disease of monkeys transmitted from monkey to monkey by an arboreal vector, *Aëdes africanus*, and to man by *Aëdes simpsoni*. Four species of monkey are mainly incriminated, especially those which are arboreal in habit. A suggestion is made that there may be a diurnal arboreal vector in addition to the nocturnal vector *Aëdes africanus*, and that there may be some other, unknown, arthropod reservoir of the virus.

LUMSDEN (p. 41) has made investigations on the ways in which yellow fever virus may be transmitted from forest monkeys to man in Uganda. Mosquito

*The information from which this series of summaries has been compiled is given in the abstracts which have appeared in the *Tropical Diseases Bulletin*, 1952, v. 49. References to the abstracts are given under the names of the authors quoted and the pages on which the abstracts are printed.

catches were made in forest canopy, forest floor, huts, plantations and nearby open spaces, and biting habits were observed. It seems that *Aëdes simpsoni*, which breeds in leaf axils of banana and colocasia plants, acquires infection from monkeys during their raids on banana plantations, and subsequently may feed on Africans working in those plantations or in the open spaces round the plantations and huts. As a very subsidiary route of infection *Aëdes africanus* may carry virus direct from monkeys in the forest canopy to Africans in the plantations. Other species which play very minor parts are *Taeniorhynchus* (*Mansonioides*) *africanus*, *T.* (*M.*) *uniformis*, and *Eretmapodites chrysogaster*.

Although in Bwamba county, Uganda, *Aëdes simpsoni* is a man-biting mosquito, GILLETT (p. 260) shows that this is not the case in several other areas, where yellow fever antibodies are not found in human sera. Selection of man as host is characteristic below 3,800 feet, and indifference to man at higher altitudes. There is evidence that the few immune persons in generally non-immune areas may have been infected by *Aëdes africanus* on its occasional visitations from forest to plantations.

LUMSDEN (p. 502) has studied the biting habits of mosquitoes caught in tree-platforms on the edge of the Semliki forest, Uganda, on 100 evenings. *Aëdes africanus* is reduced in numbers in the dry season. In most of the many species of mosquitoes caught, the peak period of activity occurred shortly after sunset.

Eretmapodites silvestris conchobius and *Aëdes simpsoni* have been found in the endemic yellow fever area of S.E. Sudan (HOOGSTRAAL and KNIGHT, p. 40).

JELLIFFE (p. 855) has found protective bodies in the sera of African children 8–9 years old in Ibadan, Nigeria, none of whom had been immunized. The disease continues to occur, therefore, though cases are rarely recognized except during epidemics ; these are probably introduced from outside.

The jungle form of yellow fever has recently been found in the Caribbean area, and SOPER (p. 855) describes the distribution of past and present outbreaks there. An account of the international yellow fever problem in the Caribbean islands has been written in general terms by DE CAIRES (p. 386).

CLARK (p. 684) describes an outbreak of yellow fever in Panama near the boundary of Costa Rica ; mouse protection tests showed positive results in a wide range of wild animals, especially in howler monkeys and some others. ELTON (p. 684) gives an account of this epidemic wave of yellow fever which started to spread in Panama in 1948 and travelled northwards at a velocity of 12–15 miles per month. Severe epizootics have been noticed in association with this human epidemic, but as the wave leaves very few non-immunes behind, no return is expected. The same author (p. 943) makes the interesting point that yellow fever did not interfere with the construction of the Panama railway in 1850–55, but took a heavy toll during the operation of the first French Canal Company (1881–89), after which it remained endemic in Panama City until Gorgas eradicated it in 1905 ; from 1906 to 1919 only imported cases were seen. There were no cases from 1920 to 1948 though surveys of the population indicate that jungle yellow fever has been present in animals of eastern Panama since 1929.

GARCÍA (p. 261) describes an outbreak of yellow fever in a district of Ecuador where an earlier survey had shown protective bodies in 15 per cent. of sera tested. All those attacked had come from outside districts to work. Monkeys are present in the area, and species of *Haemagogus* and *Aëdes* have been captured, but not *Aëdes aegypti*.

KUMM and CERQUEIRA (p. 42) describe the *Haemagogus* mosquitoes of Brazil, noting that the two proved vectors of yellow fever, *H. spegazzinii* and *H. capricorni*, can only be distinguished by examination of the male genitalia. The same authors (p. 43) give an account of the distribution of *Aëdes leucocelaenus* in

Brazil, where it has been proved a vector in nature. In a study of mosquitoes collected at ground level and at tree-platform level in Brazil, CAUSEY and DOS SANTOS (p. 504) found that the only species of *Haemagogus* was *H. spegazzinii*. This and other treehole breeders were less common during the second and third rainy seasons studied, and the authors suggest that there may exist a cycle of several years' duration, in addition to the usual seasonal cycle.

An area in which strong indications exist of the presence of a focus of jungle yellow fever, with human cases and animals and mosquitoes capable of maintaining the cycle, is described by BLAKSLEY *et al.* (p. 262) from northern Argentina.

Aetiology : Pathology : Control

ELTON (p. 856) discusses the renal changes in yellow fever, expecially in relation to the Councilman and Hoffman bodies.

White rats up to 13 days old are susceptible to intracerebral inoculation of neurotropic yellow fever virus, but rats aged 21 days are not. FINDLAY and HOWARD (p. 855) discuss this phenomenon.

For control of *Aëdes aegypti* and other mosquitoes in French Guiana, residual spray with DDT was used formerly, but FLOCH (p. 236) now reports that BHC has been substituted.

HAHN (p. 43) has developed a new type of combined vaccine which consists of a mixture of 17D virus and vaccinia virus, to be inoculated by scarification. The immunity conferred by 17D in this way develops more slowly than with the French neurotropic strain, but appears to be satisfactory, and immunity is produced before the appearance of neutralizing antibody in the serum. Tests carried out several months after vaccination of a large number of people by scarification showed immunity in 92–95·6 per cent. The vaccine can be stored satisfactorily in the dried state at 4°C.

Experiments by DICK (p. 685) show that scarification with 17D vaccine gives good development of antibody, though not quite so good as scarification with the French neurotropic vaccine, or as with 17D subcutaneously. Results with 17D by scarification were equal whether it was suspended in gum arabic or saline. The author suggests that a trial should be made of 17D prepared as a mouse-brain vaccine for scarification ; if the danger of reaction or contamination with other viruses can be ignored, the mouse-brain technique has evident advantages. *Charles Wilcocks*

MALARIA

BONNIN, H., MORETTI, G. F. & LEPROUX, P. H. Le paludisme autochtone en Charente-Maritime. [**Indigenous Malaria in Charente-Maritime**] *J. Méd. de Bordeaux.* 1952, Oct., v. 129, No. 10, 918–23, 1 map.

This is the interesting history of an erstwhile very malarious area on the west coast of France—the marshy region between the estuaries Charente and Seudre and extending from the sea to a line running south from Rochefort to Saujon.

In the 16th century Brouage, opposite the Isle of Oléron, was a flourishing port with international trade. Salt exploitation was the chief source of its prosperity. Towards the end of that century trade had declined, the port had silted up, the population left in numbers and those who were left "shook with fever". Another site for a port suitable for ships of war was sought. In 1665 a fishing hamlet on the banks of the Charente was selected. Thus Rochefort came into being. Three years later it was a town of 20,000 inhabitants.

Sailors, soldiers and adventurers congregated there were decimated by intermittent fevers. During the next hundred years "marsh fevers" prevailed unchecked despite some effort to eliminate marsh and the establishment of a Naval Medical School in 1722 and a Hospital in 1731. The drainage of marshes by the construction of canals was taken in hand under the direction of Reverseaux in 1784. In 1785 the number of births exceeded the number of deaths for the first time. But Reverseaux fell a victim to the guillotine during the French Revolution and the reclamation scheme was abandoned.

By the middle of the 19th century the situation had somewhat improved. During 14 years, from 1854 to 1867, 19,877 cases of intermittent fever had been treated at the Naval Hospital but only 22 of these patients died. Between 1882 and 1888 there was another malaria flare-up during the construction of a deep-water basin in the port : 2,331 cases were reported. Since then malaria has been little more than a bad memory at Rochefort but endemic malaria still occurs in the neighbourhood. During this century two or three indigenous *P. vivax* infections annually have been a common occurrence.

During the last 15 years the authors have found *P. vivax* in the blood of 34 patients, all locally acquired infections ; less than half of these cases were diagnosed as malaria by the doctor in charge. In many, symptoms gave little indication of the nature of the disease. In 1952 one of the authors examined 44 children in a school at Saint-Jean-d'Angle, near which several of the local infections had emanated : 10 of the children had enlarged spleens of which 4 were palpable, 2 of these being tender. Some of these children gave a history of recent fever. "Fever" is not an infrequent excuse for short absences from this school. Mosquitoes abound throughout Charente-Maritime : most are culicines but *A. maculipennis atroparvus* can still be found. *Norman White*

VAN SOEST, J. H. & VAN THIEL, P. H. De malaria-epidemie in "Vredeheim" te Rockanje in 1950. [**Malaria Outbreak in an Old People's Home in Rockanje (Netherlands) in 1950**] *Nederl. Tijdschr. v. Geneesk.* 1952, Oct. 25, v. 96 (iv), No. 43, 2681–3.

The English summary appended to the paper is as follows :—

"A description of an outbreak of malaria in 1950 which affected 59 pCt of the inmates of an Institution for the aged. It was successfully dealt with by quininization of plasmodium carriers in the autumn and disinfection of the Institute with DDT."

GHANI, A. R. & HAMID, A. **Malaria in Pakistan : a Reading List.** *Pakistan J. of Health.* 1952, July, v. 2, No. 2, 141–55.

See also p. 174, MAY, **Map of the World Distribution of Malaria Vectors.**

RAFFAELE, G. La fase esoeritrocitica dei parassiti malarici negli animali e nell 'uomo. [**Exo-Erythrocytic Phase of Malaria Parasites in Animals and in Man**] *Riv. di Malariologia.* 1952, June, v. 31, Nos. 1/3, 1–26, 2 text figs. & 6 coloured figs. on pl. [32 refs.] A French version appears in : *Scientia Medica Italica*, Rome. 1951–2, v. 2, Nos. 3–4, 631–658.

When a new discovery threatens to upset established views, it is at first inevitably received with some scepticism. But even when the new concept finally gains universal recognition, there is often a tendency to forget the pioneers who initiated it. This is the complaint which the author makes with regard to his original findings concerning the exo-erythrocytic stages of development of the malaria parasites.

The present paper is divided into two parts. In one, the author gives a historical account of his work on the EE stages, and compares his findings with those of other observers. In the second part, he discusses the localization of these stages in the tissues of primates.

Since most of this work has previously been reviewed, it will suffice to give the chronological sequence of those observations for which the author claims priority. He was the first, in 1934, to discover the tissue forms in *Plasmodium elongatum*, and later (1936) in *P. relictum*, recognizing them as the developmental stages of the sporozoite. Realizing the bearing these findings might have on human malaria, he then turned to the human parasites, and in 1937 provided circumstantial evidence of the existence of an EE phase, followed (1937, 1938) by the claim that he had demonstrated EE forms in the bone-marrow of patients infected with *P. vivax* and *P. falciparum*. On the basis of these discoveries, he gave an outline of the complete life-cycle of the malaria parasites at the 3rd International Congress of Malaria in Amsterdam (1938). The author then passes in review the work of other investigators, culminating in the recent discoveries of SHORTT and his associates.

The original part of this paper is devoted to a critical discussion of the type of cells in which the EE forms of primates develop, based, on the one hand, on the examination of the published figures by Shortt *et al.* and of sections of infected livers received from these workers ; and, on the other hand, on the histology of the liver. While admitting their localization in the liver, the author throws doubt on the development of the EE forms of the primate parasites in the parenchyma cells, but believes that—like the avian parasites—they develop in cells of the RES [reticulo-endothelial system], probably in the endothelium of the liver capillaries and in Kupffer cells. As regards other organ tissues, *e.g.*, spleen and bone-marrow (from which he described young unpigmented schizonts of human *Plasmodium*), it is conceivable that in these the development of the schizonts is arrested at an early stage.

Among the arguments adduced in favour of his views, the author refers to the irregular shape assumed by the EE forms, which finds a ready explanation if the schizonts develop in the endothelium, where they adapt themselves to the form and course of the capillaries, but is difficult to understand if they lie in the parenchyma cells, in which they are more likely to be rounded. To illustrate his concept, the author provides 5 coloured figures, showing the position of the EE schizonts of *P. cynomolgi* in relation to elements of RES and capillaries of the liver. *C. A. Hoare*

WEIDNER, H. Die Malariamückenbrutplätze Nordgriechenlands und ihre Sanierung. [**The Breeding Sites of Malaria Mosquitoes in North Greece and their Sanitation**] *Ztschr. f. Angewante Entom.* 1950, Aug., v. 32, No. 1, 86–133, 13 figs. [33 refs.] [Summary taken from *Rev. Applied Entom.* Ser. B. 1952, July, v. 40, Pt. 7, 112–13.]

The most dangerous vector of malaria in Greek Macedonia is *Anopheles maculipennis* Mg. var. *sacharovi* Favr. *A. m. maculipennis* (*typicus*), *A. m. subalpinus* Hackett & Lewis and *A. superpictus* Grassi are of less importance, while *A. claviger* (Mg.) plays little or no part in transmission. Observations during the war years showed that larvae of *A. maculipennis* were common in still, clear water with abundant vegetation, provided that this did not cause heavy shade and disturb the surface when blown by the wind (as was done by *Phragmites*) or cover the surface and so prevent the larvae from breathing (as did *Lemna*). *A. m. sacharovi* tolerates higher salinity than the other two varieties and was common in the coastal marshes. *A. superpictus* was found in hilly and mountainous country and in the plains, breeding in streams and

rivers with a pebble or gravel bed and no vegetation. The larvae preferred sunny sites, but avoided the force of the current or sheltered from it behind or under rocks and stones.

The natural and artificial factors responsible for the local existence of Anopheline breeding places are discussed in detail and illustrated by examples. The former include a sinking coastline, resulting in the formation of marshes, poor natural drainage caused by silting, which has been increased by deforestation, the drying out of streams in summer with the formation of small pools, and the existence of springs with no drainage, and man-made breeding places are provided by flooded pits and quarries, rice-fields, water allowed to leak from artesian wells or conduits, and reservoirs of all types. Accounts are given, largely from the literature, of local attempts to drain marshes by cutting ditches or improving the flow of rivers, some of which have proved successful in reducing the number of breeding sites. Field tests of larvicides and experiments on biological control were carried out in 1943–44. One boggy area that had been formed by water from an artesian well and was a prolific breeding place was completely freed from larvae by colonisation of *Lemna* on the water. *Gambusia* was bred and liberated in pools that do not dry out during the summer, but the fish suffered high mortality when transported in bulk from the breeding tanks to the pools and few survived the winter. The larvicides tested were calcium arsenite, phenothiazine (thiodiphenylamine) and Neocid (which contains DDT) ; the first two were applied in dusts, and all three in aqueous suspensions and in emulsions of oil with which they were mixed before emulsification. Good results were obtained with calcium arsenite in emulsion, but 1 per cent. phenothiazine in road dust and sprays of 1 oz. phenothiazine or Neocid and 2 fl. oz. oil in 6 gals. water at 12 pints per 40–50 sq. yards were more effective and economical and resulted in 97–100 per cent. mortality. Reasons why malaria is commoner in villages than in towns and seasonal fluctuations in the Anopheline population are discussed.

Rachou, R. G. & Borba, A. M. Um exemplar anômalo de " Anopheles darlingi " Root, 1926. Alguns dados sôbre a marcação dos tarsos dessa espécie em Marques dos Reis, Estado do Paraná. [**An Atypical Specimen of *Anopheles darlingi* in Marques dos Reis, Brazil. Note on the Tarsal Markings**] *Rev. Brasileira Malariologia.* Rio de Janeiro. 1951, Oct., v. 3, No. 4, 533–9.

The English summary appended to the paper is as follows :—

" The authors report the finding of an anomalous specimen of *Anopheles darlingi* in Marques dos Reis (Paraná). This specimen presented :

" a. Black basal ring on third and fourth hind *tarsi*.

" b. Black markings on *tarsi*, in general, larger than those commonly found in that species.

" c. The black basal band of the second hind *tarsus* represented 82·0% of the length of this tarsus ; measuring 563 specimens of *darlingi* from the same capture which gave the anomalous specimen, the authors found 57·1% as medium size of this band and 77·0% as maximum marking."

Weitz, B. **The Antigenicity of Sera of Man and Animals in relation to the Preparation of Specific Precipitating Antisera.** *J. Hygiene.* 1952, Sept., v. 50, No. 3, 275–94, 4 figs. [20 refs.]

This important paper describes the methods used by the author for the preparation of antisera with the peculiarly sensitive and specific qualities required for such delicate tests as the identification of blood-meals obtained

from insects concerned in the transmission of various diseases to man and animals. Since some of the vectors pick up very small blood-meals and since some of these may be lost or altered prior to the time of the test, it is important to use antisera known to be highly sensitive. Again, since some of the insects may have had multiple feeds off zoologically different hosts it is important that the antisera used should be highly specific.

The author's summary is as follows :—

" Specific precipitating antisera can be prepared in rabbits by the repeated inoculation of alum-precipitated serum.

" High titre of sensitivity to the homologous serum is obtained only with a complete loss of specificity.

" By absorption of the non-specific antiserum with heterologous sera the specificity can be restored.

" Two types of reactions can be observed in such non-specific antisera : (1) The homologous reaction which occurs with the sera of closely related animals, and (2) the heterologous reaction which is attributed to the presence of antigens which are widespread among mammalian sera.

" Cross-immunization experiments have demonstrated the presence of specific antigenic material in the serum of individual species.

" A schematic representation of the antigenic arrangement of mammalian sera is suggested." *R. M. Gordon*

ELIGH, G. S. **Factors influencing the Performance of the Precipitin Test in the Determination of Blood Meals of Insects.** *Canadian J. Zool.* 1952, Aug., v. 30, No. 4, 213–18, 1 fig. on pl. [12 refs.]

This paper is essentially concerned with the technique used in the preparation of the antisera necessary for the identification of the host blood found in the gut of biting flies, the method of collecting and storing such blood-meals, and the technique subsequently employed in carrying out the precipitin tests. The author's summary is essentially as follows :—" Certain factors influence the performance of precipitin tests when the latter are used for detection of blood meals of biting flies. Antisera stored in a liquid state in a refrigerator generally show a decrease in titre with the passage of time. Aging appears to have an adverse effect on the avidity of an antiserum. Smears of blood-engorged mosquitoes prepared by smearing of the entire insect are satisfactory for testing by the precipitin reaction. A high-titered antiserum which can be diluted is desirable for detection of host blood in mosquitoes."

[Dr. Eligh records that in order to obtain the blood-meal from mosquitoes the insect should not be dissected but the entire insect should be smeared on filter paper by " heavy pressure of thumb and forefinger wiping the member clean on the paper ". Such a technique, if adopted by workers in the tropics, might be attended with certain risks.] *R. M. Gordon*

FAIRLEY, N. H. **The Chemoprophylaxis and Chemotherapy of Malaria in Man with special reference to the Life Cycle.** Reprinted from *Australasian Ann. of Med.* 1952, May, v. 1, No. 1, 7–17. [54 refs.]

In the first number of this new publication pride of place is most appropriately given to the McCallum Memorial Lecture delivered at Sydney by one of Australia's most eminent sons, Sir Neil Hamilton Fairley, who performed his most outstanding work at Cairns on Australian soil whilst serving in the Australian Forces.

After a tribute to the late Dr. Frank McCallum, a former Director-General of Health of the Australian Commonwealth, Sir Neil gave a chronological

account of (I) Indirect and Direct Evidence of Tissue Stages in the Malaria Life Cycle : (*a*) Avian (*b*) Mammalian.

He recounted GRASSI's doubts, YORKE's suspicions, JAMES's deductions and SCHÜFFNER's suggestions. The successful experiments of JAMES *et al.* just before the War, and of SHORTT *et al.* and of MURROW in 1940 gave clear proof of tissue stages in avian malaria. The subinoculation experiments at Cairns suggested beyond any reasonable doubt that there should be both an early and a late tissue phase in *vivax* malaria and an early but not a late tissue phase in *falciparum* malaria. The classic experiments of Shortt and his collaborators proved Fairley's brilliant deductions to be correct.

In Section (II) Sir Neil dealt with anti-malarial drugs, reminding his hearers that the Germans had synthesized atebrin, plasmoquine and chloroquine before the war. He indicated the heavy programme of investigation into the pharmacological properties of anti-malarial drugs undertaken by the Allies on both sides of the Atlantic. Under " Pharmacological Considerations " emphasis was laid on the need to attain adequate intracorpuscular concentration of schizonticidal drugs and on the factors besides permeability which determine the concentration of a given drug within the corpuscles. The early loading dose and subsequent low maintenance dosage method of giving atebrin and chloroquine was expounded. In the cases of quinine and the 8-aminoquinolines the rapid fall of plasma concentration necessitated frequent high doses and not loading and low maintenance therapy. Concentration of an anti-malarial drug was not necessarily the whole story, *e.g.*, chloroquine was highly concentrated in the cells of the liver but had no effect on the tissue phases of parasites living there.

In Section (III) the lecturer dealt with factors modifying the therapeutic response : (*a*) different strains of parasites, (*b*) effects of premunition.

Section (IV) covered chemotherapy in relation to various stages of the life cycle : (*a*) drugs acting on the pre-erythrocytic cycle, (*b*) drugs acting on the asexual parasites in the blood, *i.e.*, the two stages in development foreseen by Fairley at Cairns as a result of his subinoculation experiments ; (*a*) causal prophylactics and (*b*) schizonticidal suppressants. Proguanil (paludrine), a causal prophylactic for most strains of *P. falciparum*, also acted as a partial causal prophylactic for *vivax* infections, prolonging the time before asexual parasites appeared in the blood and delaying the onset of overt malaria.

Atebrin [mepacrine] and chloroquine were reliable suppressants and would keep the blood film and thick drop reports negative, but a large subinoculation of blood into a non-immune would produce overt malaria. The fact that " troops, while under a proper mepacrine regime, could fight without significant malaria casualties in hyperendemic areas " was one of the outstanding discoveries of the war.

In dealing with the use of schizonticides in the clinical and radical cure of malaria Sir Neil stated that chloroquine probably terminated the clinical attack and eliminated parasites more rapidly than any other schizonticide. A large loading dose was necessary on the first day.

The curative rôles of atebrin, camoquin and paludrine were detailed, and a warning was given that if overt malaria developed in patients taking paludrine, chloroquine therapy should be adopted to ensure radical cure of the acute attack. Most of the alleged failures of paludrine as a prophylactic and suppressive appeared to be due to irregular intake and inadequate dosage. In any critical investigation chemical investigation of the urine for paludrine should be undertaken.

In Section (V) Sir Neil dealt with drugs acting on the exo-erythrocytic cycle in *vivax* malaria. He recalled the unfortunate opposition of malariologists of the League of Nations to the combined quinine-pamaquine treatment

introduced by SINTON and BIRD over a quarter of a century ago. The therapeutic value and high chemotherapeutic index of primaquine—the newest 8-aminoquinoline—was noted.

In Section (VI) " Gametocidal Drugs ", it was suggested that " it would be difficult for mosquitoes, which are feeding on the blood of a population many of whom were taking prophylactic ' Paludrine ', to develop sporozoite infection of the salivary glands ".

The ground covered by this lecture is already familiar to readers of this *Bulletin* as all the facts dealt with are to be found in the papers (many of them classics) in the excellent bibliography which is appended. Doctors in the tropics (and there are many) who are still using quinine might well note the sentence, " *The great drawback to quinine as a suppressive drug is that in a dosage of even 10 grains daily it often fails to produce radical cure of malignant tertian malaria and leads to a chronic latent or recrudescing infection in the presence of which blackwater fever is apt to develop. For this reason quinine is not the ideal suppressive drug and its use by Europeans should be discontinued.*" [Abstracter's italics.] *G. R. McRobert*

JOHNSON, W. S. & BUELL, B. G. **A New Synthesis of Chloroquine.** *J. Amer. Chem. Soc.* 1952, Sept. 20, v. 74, No. 18, 4513–16.

KALBIAN, V. H. & KALBIAN, V. V. **Clinical Trials with Camoquin in Malaria.** *J. Trop. Med. & Hyg.* 1952, Oct., v. 55, No. 10, 218–20.

The authors, in Jerusalem, treated 22 Arab refugees living in Jordan with a single dose each of Camoquin. Half of them had *P. vivax* and half *P. falciparum* infections, though 4 of the latter showed gametocytes only in the blood. The patients' ages ranged from 10 to 65 years and the dose of Camoquin in every case was 0·6 gm. (3 tablets) by mouth.

The results are given in detail in a table. They are of limited statistical value, as (1) the number was small (2) histories and the form of malaria were uncertain (*e.g.*, whether acute, chronic, relapse or re-infection) and (3) only 18 patients were followed up.

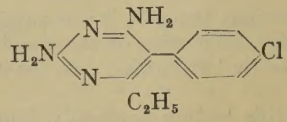
However the following observations were made : (1) no significant toxic effects were noted, (2) in 14 of 18 patients with initial fever, the temperature became normal in 12 hours after treatment, (3) in every case, except one, asexual forms of the parasite disappeared from the blood within 24 hours, (4) no uniform effect on gametocytes was noted, (5) only two relapses occurred, both *P. vivax* infections.

The results, as far as they go, support previous claims that a curative amount of camoquin can be given in a single dose. *H. J. O'D. Burke-Gaffney*

TRANS. ROY. SOC. TROP. MED. & HYG. 1952, Sept., v. 46, No. 5, 465–508. **Symposium on Daraprim : Introduction** [BOYD, J. S. K.], 465–6. **Daraprim as an Antagonist of Folic and Folinic Acids** [HITCHINGS, G. H.], 467–73, 1 fig. (23 refs.) **Daraprim—Experimental Chemotherapy** [ROLLO, I. M.], 474–84, 2 figs. **Daraprim—Clinical Trials and Pharmacology** [GOODWIN, L. G.], 485–95, 3 figs. (14 refs.) **Studies on the Compound 50–63** [COATNEY, G. R., with the co-operation of A. V. MYATT, T. HERNANDEZ, G. M. JEFFERY & W. C. COOPER], 496–7. **Discussion** [OAKLEY, C. L. & TREVAN, D. J. ; SMITH, D. ; WILSON, T. ; HAMILTON, L. ; JACOBSON, W. ; MCROBERT, G. ; SHUTE, P. G. ; ALBERT, A. ; FAIRLEY, N. H. (President) ; BOYD, J. S. K. ; HITCHINGS, G. H. (in reply) ; GOODWIN, L. G. (in reply)], 498–508.

In the chemical section of this symposium G. H. Hitchings described the steps which led to the synthesis of a large series of 2 : 4-diaminopyrimidines

of which Daraprim, 5-(*p*-chlorophenyl) 2 : 4-diamino-6-ethylpyrimidine, is a representative with the following formula :—



The substances as a class are apparently competitive inhibitors of folic and folinic acids in the growth of *Lactobacillus casei*. Those members of the above group which were substituted in position 5, while being no more toxic, showed greatest activity and it was deduced from the results obtained in this field that the group might possess marked therapeutic activity in other fields, a prediction which has now been verified. Because of a formal analogy between several of these pyrimidines and proguanil [chlorguanide] and of similarity in biological activity, anti-malarial tests were undertaken with certain members of the series [this *Bulletin*, 1949, v. 46, 1125 ; 1950, v. 47, 324]. In giving further details of the steps leading to the synthesis of Daraprim the author pointed out that the formal analogy referred to above became a structural analogy when the nature of the active form of proguanil [*ibid.*, 1952, v. 49, 362] had been determined.

I. M. Rollo described the methods used in testing anti-malarial activity against both blood and exo-erythrocytic forms of *P. gallinaceum* [*ibid.*, 1946, v. 43, 712; 1947, v. 44, 646] and also against the blood forms of *P. berghei*, on the results of which Daraprim was selected for further trial. A number of tables in the text indicate the activity of 2 : 4-diaminopyrimidines with different substituent groups in position 5 against these two parasites. When activity was indicated in the experiment, tests against the blood and tissue forms of *P. cynomolgi* were carried out. Whereas the tissue forms of *P. gallinaceum* were eradicated by Daraprim this was not so in the case of *P. cynomolgi* although blood forms were destroyed. Resistance to Daraprim can be produced in *P. gallinaceum* and *P. berghei* in the laboratory but it is believed that such a result can be avoided in the case of human malaria by the use of adequate doses of the drug.

L. G. Goodwin dealt with clinical testing and gave some facts on the pharmacology of Daraprim. In Nigeria it had been found that 5 mgm. doses of the drug cleared the blood of asexual forms of *P. falciparum* and *P. malariae* but sexual forms were not affected. The drug acted more slowly than mepacrine or chloroquine. The author also carried out tests in Nigeria and found that he suffered no ill effects on taking 5 mgm. daily for a whole year. Good reports on the suppressant action of Daraprim were also received from the Belgian Congo [this *Bulletin*, 1952, v. 49, 751]. In the Gambia extremely small doses were effective in clearing the blood and the fact that the drug was tasteless made it of value in treating children [*ibid.*, 663]. In Indo-China and Tunisia results against *P. falciparum* and *P. vivax* were also encouraging [*ibid.*, 664, 666] but less so in Malaya.

It is concluded that the chief value of the drug will be for suppressive and prophylactic purposes since it acts rather slowly in the acute attack. Pharmacological studies in laboratory animals had indicated that lymphatic tissue and the intestinal mucosa were affected by large doses, and the action resembled that of aminopterin and other antagonists of the folic acid series. In monkeys the blood picture was also affected. It appears from the experimental evidence that a metabolite of Daraprim is formed *in vivo*. The results obtained by Coatney *et al.* on white male volunteers after the bites of mosquitoes infected with *P. vivax* were also communicated. The experiments showed that Daraprim

possessed marked suppressive activity in doses of 0·78 to 12·5 mgm. weekly and so far as other results go suggest that the drug possesses causal prophylactic activity. Treatment of acute attacks with single doses of 25 mgm. of the drug did not prevent relapse. Limited data on tolerance were also reported.

J. D. Fulton

Hitchings, G. H., Maggiolo, A., Russell, P. B., VanderWerff, H. & Rollo, I. M. **3,5-Diamino-*as*-Triazines as Inhibitors of Lactic Acid Bacteria and Plasmodia.** [Correspondence.] *J. Amer. Chem. Soc.* 1952, June 20, v. 74, No. 12, 3200–201.

Wurl, O. A., Gillespie, J. O. & Beisel, W. R. **Treatment of Malaria with Cortisone.** *U.S. Armed Forces Med. J.* 1952, Sept., v. 3, No. 9, 1347–52, 6 figs.

"Six patients with benign tertian malaria in relapse were treated with cortisone daily for periods of from 3 to 6 days to determine the effect of this hormone on the clinical expression of the disease. In 4 patients there was no observable effect on the severity or cyclic nature of the clinical symptoms. In 1 patient, a lessening of the severity of symptoms without alteration of the cyclic course of the disease was noted. The sixth patient apparently went into a natural remission of his disease coincident with the administration of cortisone."

Krusé, C. W., Ludvik, G. F. & Hawkins, W. B. **Factors affecting Evaluation of Insecticides against *Anopheles* Larvae.** *J. Econom. Entom.* 1952, Aug., v. 45, No. 4, 598–601, 4 figs.

The authors, in stressing what other workers have found when testing *Anopheles larvae* of a definite instar in a graded series of DDT alcohol-water suspensions, point out that the number of larvae, the volume of suspension, the surface area and the type of container must be kept constant to obtain valid comparable results. Even when these factors are constant, data are presented in which the results are subject to wide variation in standard deviation. Increasing the number of larvae per replicate will reduce the range in mortality to be expected by chance. The number of larvae per unit surface area strongly affects mortality, and it is shown that with a given dose of DDT the mortality can be changed from 80 to 1·5 per cent. by increasing the number of larvae per test. Finally, the method of dispersion of the toxicant and the type of surface of the test container strongly influence the amount of DDT remaining in suspension upon standing. Chemical analyses have shown that emulsions are more stable than suspensions and that there is much greater loss of DDT in paper than in glass or enamelled containers.

Thomas E. Fletcher

de Jong, J. C. M. Verzoeting, verzouting en malaria in de provincie Friesland. [**Malaria and Its Control in the Province of Friesland**] *Nederl. Tijdschr. v. Geneesk.* 1952, Mar. 22, v. 96 (i), No. 12, 685–9, 1 fig. English summary (7 lines).

The English summary appended to the paper is as follows :—

"As a consequence of the enclosure of the Zuiderzee, the salt is being washed away out of the polder reservoir water in the province of Friesland. This paper deals with the significance thereof for malaria control. Around Harlingen,

an area of permanent salination exists, although fresh water is let in. Furthermore, in the neighbourhood of milk factories, where large quantities of salty Norton water are drained off, breeding places are sure to exist. Therefore, the necessity is pointed out of preventive control measures during the inter-epidemical period."

TRINIDAD GOVT. **Annual Report of the Malaria Division, Health Dept., Trinidad & Tobago. 1951.** 70 mimeographed pp., 5 graphs (3 coloured) & 1 fig.

The work of the Division for 1951 is reported under the following headings :—

(*a*) Malaria studies.
(*b*) Anopheline investigations.
(*c*) Malaria control.
(*d*) Special reports.

No epidemic of malaria occurred in a very wet year, having a total rainfall approximating 100 inches in all stations with one exception. Total deaths from malaria have fallen annually from 472 in 1944 to 136 in 1951. Of 9,474 schoolchildren examined in the colony, 2 per cent. had enlarged spleens ; of 3,496 blood smears, 3·8 per cent. were positive, of which 85·6 per cent. were *Plasmodium falciparum* infections. These figures present a significant fall in both rates.

Entomological research continues into the problems of density of production of *Anopheles aquasalis* from coastal swamps affected by tidal waters ; the second year of rice field study confirmed that the much desired extension of rice cultivation involves no increased malaria hazard except where irrigation and drainage are inefficient. The detailed account of the research work is of major interest to the entomologist and its volume is evident by the summary of work done, of which the following is some indication : adults identified 302,283 ; larvae identified 10,763 ; dissections, maxillae 528, stomach and glands 310, ovaries and spermathecae 1,074.

Routine entomological data are obtained from Shannon Dawn Traps, regular adult catches and larval survey, all of which are presented in detail. The larval survey showed that anopheline production was similar in volume to that of 1950 with breeding places of the pattern peculiar to the principal anophelines, *e.g.*, *A. aquasalis* in swamps, marshes, coastal depressions and pools and rivers and streams when stagnant or flowing ; *A. neomaculipalpus* in rice fields during the early planting and after cutting of rice, in savannah pools and drains and new excavations ; and *A. albitarsis* in rice fields during the growth of rice and in ponds and drains.

Extensive malaria control measures of a temporary nature are necessary in the absence of permanent works, which are the function of a Sanitary Engineering Unit not yet in existence in Trinidad. The report observes : " Malaria control engineering is one of the most highly specialised branches of sanitary engineering and we have witnessed the discomforting spectacle of Health Departments in other countries trying to do without this engineering department or being forced to do without it, incurring considerable expenditures without adequate commensurate results ".

The special measures to control Bromeliad malaria appear satisfactory, *viz.*, manual removal of the major host plants or spraying copper sulphate solution with special apparatus, all of which involved specially trained units.

The residual insecticide programme has been extended to protect 180,000 people in the principal malaria areas ; 27,958 homes were sprayed with 34,381 gallons of DDT in kerosene by 7 units, each of 5 men, dealing with 20 to 30 houses per day per unit.

Efforts to reduce the *Aëdes aegypti* index to near zero have not met with success, mainly because of lack of co-operation by householders in properly disposing of an inordinate number of tin cans and bottles and in retaining unprotected receptacles for domestic water supplies.

A detailed account and records of successful field tests of dieldrin wettable powder 25 per cent. indicate the potentialities of this formulation as a larvicide ; it was considered to be more effective than high spreading oil containing dieldrin and both were superior to any of the DDT combinations. On cultivated rice fields dieldrin wettable powder was found to be an " extremely effective " larvicide ; at 0·12 lb. per acre control is effective for 2 weeks after spraying. No adverse effect was noted on growing rice.

At the close of the year tests were in process on the residual toxicity of dieldrin against adult *A. aquasalis* when applied as an emulsion to different types of surfaces.

The joint programme of the Government of Trinidad and Tobago and the Rockefeller Foundation in the Malaria Eradication Project in Tobago, B.W.I., was continued throughout 1951 along similar lines as in previous years with greater emphasis during the year on the execution of capital works in order to control the major permanent breeding places of *A. aquasalis*. Results are tabulated to show malariometric indices, anopheline trap catches, etc. ; the overall spleen rate in schoolchildren has fallen as follows :—1941, 1950 and 1951 respectively, 16·7, 1·06 and 0·8 per cent.

R. Ford Tredre

DE BUSTAMANTE, F. M. Efeito das aplicações intradomiciliárias de DDT sôbre a densidade do *Anopheles darlingi* em várias regiões do Brasil. [**Effect of DDT House Spraying on the Density of** *Anopheles darlingi* **in Different Regions of Brazil**] *Rev. Brasileira Malariologia*. Rio de Janeiro. 1951, Oct., v. 3, No. 4, 571–90, 2 figs. [13 refs.] English summary.

Anopheles darlingi is the most domesticated species of all the malaria vectors of the South American continent. It frequents human habitations in large numbers in search of food wherever it occurs. This characteristic of the species renders it very vulnerable to insecticidal sprays. In Venezuela and in the coastal regions of British Guiana the elimination of the species may result from the DDT residual spraying of houses alone. In Brazil, however, *A. darlingi* displays a lesser degree of partiality for human blood. In preliminary surveys that preceded DDT spraying operations, carried out at seasons of great anopheline prevalence, in 7 low-lying coastal localities, the number of *A. darlingi* captured per hour's search was some 3½ times as great inside human dwellings as outside where horses were the attraction. In 8 places in the uplands of the San Francisco river valley the number of *A. darlingi* associated with animals was double that found in human dwellings. The density of *A. darlingi* is much greater in the interior than along the coast. Other similar observations are recorded for the States of Rio de Janeiro and Paraná respectively. These show a similar greater tendency for *A. darlingi* to display zoophilic characteristics in the interior than along the coast.

Data concerning the prevalence of *A. darlingi* in a number of places in the low-lying Rio de Janeiro State and in the San Francisco River Valley, during 4 or 5 years in which systematic DDT house spraying has been carried out, are given in tabular form. In the coastal area the species is becoming scarce in places and persistence in spraying measures might eventually result in its eradication. In the San Francisco Valley, however, such a result cannot be

looked for : here adult *A. darlingi* continue to be caught with animal bait in considerable numbers, and larvae continue to be found, in spite of the spraying.
Norman White

Hsu, Doris Y. M. & Geiman, Q. M. **Synergistic Effect of *Haemobartonella muris* on *Plasmodium berghei* in White Rats.** *Amer. J. Trop. Med. & Hyg.* 1952, Sept., v. 1, No. 5, 747–60, 5 figs. [29 refs.]

The course of infections of *Plasmodium berghei* (strain KBG 173) in laboratory animals was studied and it was found that most consistent results were obtained by intravenous inoculation of a standard dose (60 million parasites per kgm.) to white rats weighing 60–100 gm. Infections were poor or absent in rats weighing over 150 gm., in hamsters over 70 gm. and in mice aged more than 3 months. Older animals usually overcame the disease easily with the development of a complete immunity. The clue to this effect of age appears to be that in young animals polychromatophilic erythrocytes are common, and it is such cells that are pre-eminently invaded by the parasite. Similarly a concomitant infection of *Haemobartonella muris* stimulates the production of polychromatophilia and leads to an increase of the malaria parasite and a higher death rate (50 per cent. as compared with 13·8 per cent. in bartonella-free rats). The synergic effect of the *Plasmodium* on the bartonella, on the other hand, may be due to blockage of the spleen as a result of the malaria.

[In the introductory review it is stated that van den Berghe *et al.* (this *Bulletin*, 1950, v. 47, 816) found schizonts in the liver 36 hours after intraperitoneal inoculation of infected blood, and that the cycle of *P. berghei* has thus a similar pattern to that of the other mammalian plasmodia. This is surely an incorrect assumption, because the liver cells said to be parasitized by *P. berghei* are reticulo-endothelial instead of parenchyma cells, and the injection was by blood which is incapable of giving rise to exo-erythrocytic parasites of the mammalian type.] *P. C. C. Garnham*

Ramakrishnan, S. P., Satya Prakash & Krishnaswami, A. K. **Studies on *Plasmodium berghei* n. sp. Vincke and Lips, 1948. III. Latency, Relapse and Immunity in Albino Rats with Blood-Induced Infections.** *Indian J. Malariology.* 1951, Sept., v. 5, No. 3, 447–54, 1 graph.

The authors describe latent infections with *Plasmodium berghei* produced in rats by intraperitoneal inoculation of blood containing about 8×10^5 parasites. Of 170 infected animals, 95 died within a fortnight during the acute phase, whereas in 75 the infection became latent. In 50 per cent. of these rats, a first relapse—with low parasitaemia and of short duration—developed in the first or second month after infection, while in 10 per cent. there was a second relapse in the third month or later. Since latency occurred in various age-groups, it was evident that recovery from the primary infection was not due to the age factor, but probably to individual variation in the degree of resistance to infection. During the latent phase the rats were immune to superinfection with the homologous strain of parasite, and the infection lasted at least 6 months, as shown by successful subinoculation of clean rats. The results are shown in 6 tables. *C. A. Hoare*

Ramakrishnan, S. P., Krishnaswami & Satya Prakash. **Studies on *Plasmodium berghei* n. sp. Vincke and Lips, 1948. IV. The Reaction of Blood-Induced *P. berghei* in Albino Mice to Quinine and Sulphadiazine.** *Indian J. Malariology.* 1951, Sept., v. 5, No. 3, 455–64. [14 refs.]

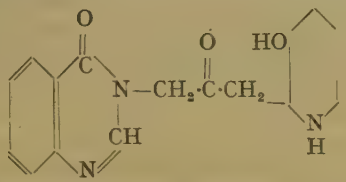
The authors report the results of treatment with quinine and sulphadiazine of mice infected intraperitoneally with blood containing 5 million parasites

(*Plasmodium berghei*). Since some of the animals (11·5 per cent.) were refractory to the first inoculation, the tests were started after parasitaemia was established. The criterion of the minimum effective dose (MED) was elimination of the parasites from the peripheral blood for 3 consecutive days after oral administration in divided doses on 3 consecutive days of patent parasitaemia. *P. berghei* proved to be highly susceptible to sulphadiazine, the MED of which was 0·12 mgm. per 20 gm. body-weight, whereas that of quinine was 96 mgm. The response of *P. berghei* to sulphadiazine was thus similar to that of simian and human malaria parasites. The results are shown in 4 tables.

C. A. Hoare

Hewitt, R. I., Wallace, W. S., Gill, Edna R. & Williams, J. H. **An Anti-malarial Alkaloid from *Hydrangea*. XIII. The Effects of various Synthetic Quinazolones against *Plasmodium lophurae* in Ducks.** *Amer. J. Trop. Med. & Hyg.* 1952, Sept., v. 1, No. 5, 768–72.

The active principle from leaves of a number of *Hydrangea* spp. has been shown to be an alkaloid 3-[β-keto-γ-(3 hydroxy-2-piperidyl) propyl]-4-quinazolone, of structural formula



which possesses high activity against *P. lophurae*. It is apparently identical with one of the alkaloids previously obtained from *Dichroa febrifuga*, which although very toxic was shown to possess activity against *P. vivax* [this *Bulletin*, 1950, v. 47, 1177]. A series of 54 related quinazolones have therefore been examined for anti-malarial activity against *P. lophurae* in ducks. The animals used were 2 weeks old and weighed about 200 gm. They were infected intravenously with blood from a donor bird, and the results of drug treatment, which was given orally twice daily for 3½ days after inoculation, were followed in stained blood smears. It was found that most of the substances tested showed some degree of activity, a number being half as active as the natural alkaloid which proved about 100 times as effective as quinine in this infection. A few had even higher therapeutic indices. Variations in activity resulted from the introduction of a number of substituent groups.

None of the substances tested, however, showed activity against *T. equiperdum*, *L. donovani*, or *S. mansoni*. *J. D. Fulton*

Corradetti, A. & Cavaceppi, Luciana. **Relations between the Endohistiocytic Forms of *Plasmodium gallinaceum* and the Immunological Course of the Infection in Fowls inoculated with Infected Brain Tissue.** *Amer. J. Trop. Med. & Hyg.* 1952, Sept., v. 1, No. 5, 761–7. [26 refs.]

Fowls (3–6 months old) were inoculated intramuscularly with brain emulsions containing exo-erythrocytic forms of *Plasmodium gallinaceum* (from a strain maintained in blood passage for 14 years). Nineteen serial passages were then made, and 46 out of 60 fowls exhibited exo-erythrocytic forms (erythrocytic infection was present in all but two). During these passages, 115 brain biopsies were made at different intervals, and it was found that exo-erythrocytic parasites occurred only between the 8th and 25th days after inoculation. Two

of these fowls were re-inoculated on the 43rd and 84th days respectively with fresh infected brain emulsions but failed to show a new exo-erythrocytic invasion. In another series, splenectomy was performed late in the infection, relapses occurred in 11 out of the 12 fowls, but brain biopsies during the relapses were negative. Then 6 of these last fowls were re-inoculated, after splenectomy, with infective brain tissue, more biopsies were made and again exo-erythrocytic forms failed to develop. These experiments neatly demonstrate first the limited period of exo-erythrocytic schizogony in the brain, and second the apparent resistance of the endothelium to subsequent infection.

[In an interesting footnote the authors again plead for the rejection of the unsuitable term "exo-erythrocytic" and the use of (1) endo-erythrocytic, (2) endo-haemoblastic, (3) endo-histiocytic, and (4) hepatic endo-epithelial, to describe the location of malaria parasites. Corradetti's terms are certainly more precise, but the older words have a useful general applicability and would now be difficult to dislodge.] *P. C. C. Garnham*

ROLLO, I. M. **"Daraprim" Resistance in Experimental Malarial Infections.** [Correspondence.] *Nature.* 1952, Sept. 6, v. 170, 415.

It was reported by FALCO *et al.* [this *Bulletin*, 1951, v. 48, 872] that Daraprim, one of a series of 2 : 4-diaminopyrimidines, had marked anti-malarial activity against laboratory infections of *P. gallinaceum*, *P. berghei*, and *P. cynomolgi*. It has also been used with success in human malarial infections [ARCHIBALD, *ibid.*, 1952, v. 49, 11 ; MCGREGOR and SMITH, *ibid.*, 663 ; SCHNEIDER *et al. ibid.*, 664, 666 ; GOODWIN, *ibid.*, 664]. It was stated by the present author [*ibid.*, 1951, v. 48, 1086] that *P. gallinaceum* was not readily made resistant to Daraprim by the usual methods, and that proguanil-resistant strains of this parasite and of *P. berghei* were sensitive to the drug. He has now found that after 42 treated passages over a period of 70 weeks with increasing doses of drug *P. gallinaceum* has become highly resistant. The resistance in the case of *P. berghei* was produced in a somewhat different manner and in a much shorter time, by treating a mouse, approximately half of whose red cells were infected, with a single dose of drug. On relapse a second dose of drug was given and the strain was passaged when a further relapse occurred. After treatment of two more mice in this way resistance to Daraprim was found to be 20-fold and was further increased till it reached a high level, and thus produced resistance in a relatively short time compared with that required in *P. gallinaceum*. Since the drug will probably be employed in human malaria in suppressive doses as in the above treatment of *P. gallinaceum* under laboratory conditions, it is suggested that the problem of resistance in human malaria parasites, in practice, is not greatly to be feared (as in the case of proguanil where resistance can also be easily induced in the laboratory and yet is so effective in the field).

J. D. Fulton

ATCHLEY, F. O. **Notes on *Leucocytozoon andrewsi* from the Domestic Chicken.** [Research Notes.] *J. Parasitology.* 1952, Oct., v. 38, No. 5, 497–8.

TRYPANOSOMIASIS

WILLIAMSON, J. & ROLLO, I. M. **Stimulating Effect of Amino-Acids on the Survival at 37°C. of *Trypanosoma rhodesiense* in a Serum-Free Synthetic Medium.** [Correspondence.] *Nature.* 1952, Aug. 30, v. 170, 376–7.

The authors have analysed the factors which promote the survival of *Trypanosoma rhodesiense in vitro* at 37°C. By washing the trypanosomes and

then adding varying amounts of serum, they have shown that variations in the survival time in the medium devised by YORKE *et al.* [this *Bulletin*, 1930, v. 27, 237] were due to the presence in the inoculum of serum, which favours their viability.

Washed trypanosomes were then suspended in buffered Ringer solution alone (*BR*), or with addition of glucose (*G*), trace metal salts (*M*), and 10 amino-acids (*A*). The survival time in *BR* was 0·5 hr., in *BRG* and *BRGM* 1 hr., and in *BRGMA* 4·5 hr. Vitamin-free casein hydrolysate produced the same effect as *BRGMA*, and prolongation of the survival period for 1–2 hr. was obtained by addition to *BRGMA* of various combinations of adenine, adenosine, yeast and thymus nucleic acid, ribose, nicotinamide, and nicotinic acid. A more marked effect on survival of trypanosomes was produced by addition of ultra-filtered rabbit serum (8 hr. with *BRGMA*). The viability of trypanosomes is also affected by the gaseous environment : while CO_2-free air, pure O and N were toxic to cultures in *BRGMA* containing water-soluble vitamins, adenine and ribose, the survival in this medium was enhanced by addition of 5 per cent. CO_2, and especially by a mixture of 5·6 per cent. CO_2, 7·8 per cent. O, and 86·6 per cent. N. *C. A. Hoare*

GANZIN, M., REBEYROTTE, P., MACHEBOEUF, M. & MONTEZIN, G. Étude par électrophorèse des fractions protéiques du sérum sanguin d'hommes et de cobayes infectés par des trypanosomes. [**Electrophoretic Studies of Blood Protein Fractions in Man and Guineapigs Infected with Trypanosomes**] *Bull. Soc. Path. Exot.* 1952, v. 45, No. 4, 518–24, 5 figs. & 1 diagram. [13 refs.]

The sera of guineapigs infected by trypanosomes were examined by micro-electrophoresis on paper and by the classical electrophoresis method of TISELIUS. Infection with *T. nagana* [presumably *T. brucei*] produced a considerable fall in albumins, a disturbance in the α_2-globulins (bifurcation of the electrophoresis peak) and an increase in the γ-globulins. β_1-globulins also made their appearance. In *T. gambiense* infection similar but more pronounced changes occurred. In the African with trypanosomiasis there was a considerable increase in the γ-globulins and a decrease in albumins. The A/G ratio fell from the normal value of 1·9 to 0·66 in the blood-lymphatic stage, rising to 1·55 in the stage of central nervous involvement. *J. H. Birkinshaw*

TRINCÃO, C., PARREIRA, F., FRANCO, A. & GOUVEIA, E. A cultura *in-Vitro* da medula óssea na doença do sono. [**Culture *in vitro* of Bone Marrow in Sleeping Sickness**] *Gaz. Méd. Portuguesa.* 1952, v. 5, No. 3, 396–400, 2 figs. & 3 charts. English summary.

The authors refer to the observations of ASTALDI and TOLENTINO on cultures *in vitro* of bone marrow in leishmaniasis [this *Bulletin*, 1950, v. 47, 153] and to a previous paper by Trincão and Gouveia on the blood and bone marrow in sleeping sickness [*ibid.*, 1951, v. 48, 239]. They now record the results of their examination of hanging-drop cultures of the bone marrow in two cases of sleeping sickness in the early stage of the disease ; they found a delay in the maturation of the erythroblasts and granuloblasts similar to that observed by Astaldi and Tolentino. *J. F. Corson*

CECCALDI, J., TRINQUIER, E. & ARNOULT, H. **About the Use of Trepolysin (4000 M) or Camphosulfonate of Meta-Amino-Para-Hydroxy-Phenyl-Arsenoxy in the Treatment of Sleeping Sickness.** *Bureau Permanent Interafricain de la Tsé-Tsé et de la Trypanosomiase. No. 191/T.* Léopoldville (Congo Belge). 1952, July 4. 5 mimeographed pp., with 2 folding tables.

This trivalent arsenical compound is stated to act on nervous syphilis and was found to be trypanocidal in experimental tests ; it was therefore tried by

the authors in 14 cases of *gambiense* sleeping sickness most of which showed infection of the cerebrospinal fluid. The drug was given in a series of 15 intravenous injections daily or on alternate days. In one group of 7 patients a series of injections of 0·12 gm. was given while in the other group of 7 the dose was progressively increased up to about 0·24 gm. given on alternate days. Trypanosomes rapidly disappeared from the lymphatic glands (they were not seen in the blood), but the drug had no beneficial effect on the cerebrospinal fluid and the authors thought that in some cases it aggravated the disease and hastened its progress ; in some patients it caused vomiting, diarrhoea or jaundice. The authors conclude that it is unsuitable for the treatment of sleeping sickness. *J. F. Corson*

ROUBAUD, E. Action de l'Antrycide sur les infections trypanosomiennes des tsé-tsés. [**Action of Antrycide on Trypanosome Infections of Tsetse Flies**] *Bull. Soc. Path. Exot.* 1952, v. 45, No. 4, 451–6.

The author received some tsetse flies (*Glossina caliginea*) from the Cameroons and made two experiments to see whether antrycide would act on trypanosome infections present in the flies. In the first experiment 10 flies were put to feed daily from March 3rd to April 3rd, 1950, first on a goat, then on a guineapig, both of which had been given antrycide methylsulphate on March 3rd, the goat getting a dose of 5 mgm./kgm. and the guineapig 10 mgm./kgm. Two flies died next day without having fed ; on March 6th two flies were killed and one showed living trypanosomes, the other only dead ones ; on March 7th, of 2 flies that had died, 1 showed dead trypanosomes and crithidia, the other a few dead crithidia only ; on March 8th a dying fly had dead crithidia ; 2 flies killed on March 24 and 27 showed no infection ; the tenth fly was killed on April 3rd and showed a heavy infection of active trypanosomes. All the trypanosomes were of the *T. vivax* type and were seen only in the proboscis. Among 13 control flies there were 8 proboscis infections of *T. vivax* type, all active and 5 intense.

In the second experiment 21 *G. caliginea* and 6 *G. palpalis* were used ; they were fed from June 13th on a guineapig which had received a dose of antrycide chloride (10 mgm./kgm.) and were killed and examined successively from June 15th to July 6th ; 8 were infected, 6 with proboscis infections of *T. vivax* type (active in 5) and 2 had active infections with *T. congolense*, 1 of the gut and the other of the proboscis.

The author concludes that in the first experiment antrycide methylsulphate reduced the proportion of infections by over 60 per cent., while in the second experiment, antrycide chloride had no effect ; its possible action in early stages of infection of tsetse flies with various trypanosomes remains for investigation. He refers to recent experiments by LEWIS (*East African Agric. J.*, 1950, v. 15, 57) who found that antrycide had no action on infections of *G. pallidipes* with *T. vivax*, and who suggested the possibility of the trypanosomes becoming resistant to the drug. *J. F. Corson*

WALLS, L. P. & BEVERIDGE, E. **Reduction of Nitrophenanthridinium Salts : Influence of Molecular Size on Trypanocidal Activity.** [Correspondence.] *Nature.* 1952, Oct. 18, v. 170, 666–7.

It was shown [this *Bulletin*, 1948, v. 45, 690] that the crude reduction products of certain nitro-substituted cinnoline quaternary ammonium salts possessed much higher activity against *T. congolense* infections of mice than the amino compound which it was intended to prepare. The result was attributed to the formation of an azo compound. The present authors have made a somewhat

similar observation when reducing phenanthridinium salts with iron powder and water, when small amounts of by-products were formed. On reducing 2 : 7-diamino-10-methyl-9-*p*-nitrophenylphenanthridinium chloride in this way in order to prepare the corresponding amino derivative which is highly trypanocidal a large yield of a sparingly soluble substance was obtained, and very little of the desired amino derivative. The insoluble substance has been shown to be the corresponding azo compound and its production from a nitro compound in this way is analogous to what happened in the cinnoline series. In contrast, however, this new azo compound was very much less active against *T. congolense* infections in mice than the parent nitro or amino derivatives [*ibid.*, 1950, v. 47, 1070], but on the other hand showed relatively high activity against *T. rhodesiense* compared with other members of the series, and also possesses marked prophylactic activity. Its properties have been ascribed to its particular molecular pattern. *J. D. Fulton*

Pizzi P., T. & Prager S., Ruth. Inmunidad a la sobreinfección inducida mediante cultivos de *Trypanosoma cruzi* de virulencia atenuada. (Comunicación preliminar). [**Immunity to Superinfection Induced by Attenuated Cultures of** *T. cruzi*] *Bol. Informaciones Parasitarias Chilenas.* 1952, Apr.–June, v. 7, No. 2, 20–21.

The English summary appended to the paper is as follows :—

" The inoculation of C3H mice with cultures of *Trypanosoma cruzi* that had been maintained for 6 years by serial transfers every 10 days in Senekjie's medium, was followed by the rapid phagocytosis of most of the elements of the culture. An attenuated infection was obtained. The animals thus treated, developed a marked immunity to the superinfection with virulent blood stages of the parasite."

Pizzi P., T., Rubio D., Mafalda, Prager S., Ruth & Silva C., R. Acción de la cortisona en la infección experimental por *Trypanosoma cruzi*. (Comunicación preliminar). [**Action of Cortisone in Experimental** *T. cruzi* **Infection**] *Bol. Informaciones Parasitarias Chilenas.* 1952, Apr.–June, v. 7, No. 2, 22–4.

The English summary appended to the paper is as follows :—

" These experiments have shown that the administration of high doses of cortisone produce an intensification of experimental *Trypanosoma cruzi* infection in mice of the Rockefeller strain. With lower doses, a slight beneficial effect was observed. The aggravation seems to be the result of marked involutive changes of the lymphoid-macrophage system as a result of overdosage of the hormone.

" The repetitive administration of high doses of cortisone had no effect on the course of chronic and mild infection in rats of the A/c strain."

Armleder N., H. & Jarpa G., A. Ensayos de Quimioterapia en la enfermedad de Chagas experimental. IX. Fumagilina. [**Chemotherapeutic Trials in Experimental Chagas's Disease. IX. Fumagillin**] *Bol. Informaciones Parasitarias Chilenas.* 1952, July–Sept., v. 7, No. 3, 38–9.

The English summary appended to the paper is as follows :—

" The administration of fumagillin was unsuccessful as a therapeutic agent in experimental Chagas disease of mice."

See also p. 120, Seneca, Kane & Rockenbach, **Protozoicidal Properties of Rimocidin.**

LEISHMANIASIS

Sen Gupta, P. C. **A Report on Kala-Azar in Assam.** *Indian Med. Gaz.* 1951, June & July, v. 86, Nos. 6 & 7, 266–71 ; 312–17, 2 maps & 7 charts.

The history of kala azar in India has indicated that national disasters such as earthquakes, famines and epidemics of other diseases, have always been followed by an increase in the incidence of kala azar. In more recent times, the earthquakes in North Bihar in 1934 were followed by a great increase in the disease in this Province so that in 1938 it was reliably estimated that there had been 90,000 cases in the previous year [this *Bulletin*, 1941, v. 38, 251]. The author has investigated the effect of the serious earthquake in Assam in 1950 on the incidence of kala azar in that province.

Graphs of the kala azar incidence in Nowgong, Sibsagar, Goalpara, Darrang, Kamrup and the Garo Hills, the main endemic areas, each show two peaks, about 1924 and 1940 in the first three, but in Darrang, Kamrup and the Garo Hills the second peak was delayed until later, 1947–49, and in all the curve is falling in 1949 so that any subsequent rise as a result of the earthquake will stand out. However, it was not in the districts that the effect of the earthquake was most severe. In all these districts, except in the Garo Hills, the oldest endemic area and one where mass treatment is more difficult administratively, the second peak has not been as high as the first. This is probably due to the mass treatment campaigns in this Province which have been the only means adopted to control the disease. Another factor which may influence the curves in the future is the appearance of drug resistance. It is very noticeable that the number of cases in which the usually adequate courses of antimony treatment now have no effect is increasing. This makes mass treatment more difficult and more expensive and the author considers that it may mean a change to other means of control of kala azar in Assam, such as residual DDT spraying.

The main value of this paper is that it summarizes the kala azar situation in Assam and it will be valuable for further reference. [The *Tropical Diseases Bulletin* reference given by the author should read as shown above, and not p. 254, as cited in his list of references.] *L. E. Napier*

Jacob, V. P. & Kalra, S. L. **Kala-Azar in Kashmir.** *Indian J. Med. Res.* 1951, July, v. 39, No. 3, 323–7.

Kala azar has not been recorded previously in Kashmir. However, during 1948 and 1949, 12 cases, including 7 in Gurkhas, were diagnosed in the State Army ; the diagnosis was confirmed by the demonstration of leishmania in the sternal marrow. At least 5 of these cases were indigenous in origin, and all these 5 men had at some time been stationed at the village of Budil (6,000 feet) in Jammu province.

A sandfly survey was carried out in 1949 and 1950. Sandflies of 9 species were caught, one was a new species and the remainder were *Phlebotomus major*, *P. papatasi*, *P. sergenti*, *P. chinensis*, *P. minutus* var. *antennatus*, *P. baghdadis*, *P. squamipleuris*, and *P. montanus*.

P. major was the most frequently encountered and was found up to 6,800 feet. *P. papatasi* was found in both Jammu and Kashmir province at altitudes up to 5,700 feet. The next two most frequently encountered were *P. sergenti* and *P. chinensis*, but these were found in all these provinces and up to 10,500 feet. The other 5 species were rare.

In Budil only *P. major* was found.

A number of sandflies were dissected but no leishmaniae were found. Several dogs were examined but none was found infected. The authors state " In some

of the cases mentioned below, the disease was definitely contracted in the State and the sandfly survey indicated that there was probability of further cases".

[While there are present many sandflies of species that are capable of transmitting kala azar, the climatic conditions are unfavourable for transmission ; it is probably for this reason that the disease is not normally endemic in Kashmir.

Gurkhas frequently become infected in their own country where there are many endemic foci of kala azar. It seems quite possible that the presence of several infected persons living in close proximity with others caused the development of a micro-focus of leishmania infection within the military quarters, even though the general outside climatic conditions were not favourable for transmission.] *L. E. Napier*

Sen Gupta, P. C., Bhattacharyya, B., Das, A. K. & Sanyal, N. N. **Treatment of Post-Kala-Azar Dermal Leishmaniasis with Methyl Glucamine Antimoniate.** *J. Trop. Med. & Hyg.* 1952, Sept., v. 55, No. 9, 205–8.

The treatment of post-kala azar dermal leishmaniasis has never been entirely satisfactory. The condition is always slow to respond and in some cases has proved entirely refractory. It is unaffected by the aromatic diamidines. The routine treatment for this condition at the Calcutta School of Tropical Medicine is with aminostiburea or urea-stibamine. Recently, a number of patients were treated with methyl glucamine antimoniate (glucantime) ; the present report gives the results in 30 patients who completed an adequate course of treatment.

Details of the cases and the response to treatment are given in tabular form. The median of the age-group curve was the third decennium ; in fact half the patients were between 21 and 30. The interval between the attack of kala azar and the onset of dermal leishmaniasis varied from a few months to 10 years, but in 19 of 27 cases it was within 2 years. The duration of the lesions [presumably when treatment was started] varied up to 10 years, but it was under 1 year in 18, under 2 years in 21 and under 4 years in 27 cases. There were nodular lesions in 21 cases usually combined with hypo-pigmented macules and in 9 cases there were macules with or without erythema on other parts of the skin but with no nodules. The number of injections varied from 12 to 53 and the total amount of methyl glucamine antimoniate, 30 per cent. antimony, from 80 to 640 ml. Thirteen patients were cured, of whom 8 had over 30 injections, and in 7 the treatment failed, only one of whom had over 30 injections ; the remainder were divided equally between the fair- or marked-improvement groups. The failures were mostly among patients showing the hypo-pigmented macules.

The results were very similar to those obtained with aminostiburea and urea-stibamine, but the authors consider that glucantime was more effective than the other drugs in the case of erythematous lesions. *L. E. Napier*

Nasir-Ud-Din, M. **DDT in the Prevention of Kala-Azar in East Pakistan.** *Pakistan J. of Health.* 1952, Apr., v. 2, No. 1, 21–4.

Residual spraying with DDT was undertaken in connexion with a malaria control scheme under the auspices of WHO, in Mymensingh, East Bengal, in July 1949 ; less than a third of the houses were sprayed. From January to July 1950 the blood of 2,600 children was tested for kala azar by the aldehyde test (capillary tube method) and 510 (or 19·6 per cent.) were found to be positive ; these were given treatment by urea-stibamine. The percentage of positive cases in the sprayed area was 38·3 and in the unsprayed 16·8. This apparent anomaly is explained as indicating that the spraying had destroyed anopheles and thereby reduced the malaria, but by that time had had no effect on the

kala azar incidence, and, as patients were selected for blood tests because they had enlarged spleens the reduction of malaria in the " sprayed " houses caused a relative (though not actual) increase in kala azar. At the time the blood specimens were taken the remainder of the houses were sprayed.

At a second survey in the same area between October 1950 and January 1951, it was found that among the 3,052 children whose blood had given a negative test for kala azar at the first survey, of 899 children whose houses had been sprayed in July 1949, only 1 was now positive and this child had lived outside the sprayed area for two months. However, 40 of 2,153 whose houses had only been sprayed in May–June 1950 gave a positive result.

The assumption is that spraying does not affect the kala azar incidence within a few months, but has a material effect after a year or more.

[A table shows the number of sandflies caught month by month from March to December 1950, in the sprayed and unsprayed houses ; they total 494 and 4, respectively. There is no direct reference to these figures in the text, but there is other evidence to suggest that the figures should be reversed.] The largest numbers of sandflies were caught in April and May. Among the sandflies identified were *Phlebotomus argentipes*, *P. theodori*, *P. africanus*, and *P. minutus*.

L. E. Napier

YOUNG, S. **The Fate of *Leishmania donovani* and *Leptomonas donovani* injected into the Peritoneal Cavity of Chinese Hamsters and Guinea-Pigs.** *Chinese Med. J.* Peking. 1951, Nov.–Dec., v. 69, Nos. 11/12, 497–505, 7 figs. on pl.

" The report shows that the Leishman-Donovan bodies after intraperitoneal inoculation in hamsters and guinea-pigs were chiefly phagocytosed by neutrophilic leucocytes during the first 24 hours. After this period they were mainly engulfed by the histiocytes in the peritoneal fluid. A number of leishmania-containing histiocytes occur regularly in the peritoneal fluid of hamsters infected with kala-azar.

" The fusiform flagellates [=culture forms] after intraperitoneal inoculation were not found within the cytoplasm of the histiocytes. They disappeared entirely from the peritoneal fluid about 9 hours after injection."

[The author erroneously applies the generic name *Leptomonas* to the flagellates in culture, reserving the genus *Leishmania* for the L.D. forms in the mammalian host.]

C. A. Hoare

PARROT, L. & DONATIEN, A. Autres observations sur l'infection naturelle des Phlébotomes par la leishmaniose générale de l'homme et du chien en Algérie. [**New Observations on Natural Infection of *Phlebotomus* by Leishmaniae in Algeria in Relation to Leishmaniasis in Man and Dogs**] *Arch. Inst. Pasteur de'Algérie.* 1952, June, v. 30, No. 2, 146–52. [12 refs.]

In recent years the authors have collected, between April and October, 598 female *Phlebotomus* in the kennels at Kouba near Algiers. They have dissected them and examined them for flagellate forms of *Leishmania*. In this paper they present an analysis of the results.

Three species were positive as follows : *P. perniciosus* 25/242 (10·3 per cent.) ; *P. longicuspis* 51/333 (15·3 per cent.) and *P. sergenti* 2/16 making a total of 78/591 (13·1 per cent.). The analysis goes on to show that the highest percentages of infected flies were taken in May and August, though the numerical prevalence was at its peak during June and July.

Other tables show the number of times flagellates were found in different parts of the digestive tract and the approximate intensity of the infection

according to the number of flagellates found. Out of 78 infected flies, 17, consisting of 5 *P. perniciosus* and 12 *P. longicuspis*, showed such an abundance of flagellates that the proventriculus was " blocked ".

The authors conclude that *P. longicuspis* is as able as *P. perniciosus* to transmit infection from dog to dog or from dog to man. They are the chief, if not the only, vectors of general leishmaniasis in this part of the African continent.

H. S. Leeson

THORNBURGH, D. B., JOHNSON, C. M. & ELTON, N. W. **The Histopathology of Cutaneous Leishmaniasis in Panama.** *Trans. Roy. Soc. Trop. Med. & Hyg.* 1952, Sept., v. 46, No. 5, 550–54, 5 figs. (4 on 2 pls.)

American cutaneous leishmaniasis is a disease caused by the parasite *Leishmania brasiliensis*, believed to be transmitted by a species of phlebotomus. The lesion begins as a small papule which becomes red, itchy and may vesiculate. The duration of this primary phase probably varies from 1 to 4 weeks. Ulceration follows and persists for 6 months to several years, although most cases heal within 12 to 15 months. The characteristic ulcer has a punched-out appearance with a raised indurated margin. Healing results in a pliable, depigmented scar.

Diagnosis depends upon demonstration of the organisms by culture, biopsy or smears of currettings of the ulcer margin. The histology is, however, usually sufficiently characteristic to indicate the diagnosis and stimulate a search for parasites.

Biopsy material from 20 cases examined at the Board of Health Laboratory, Panama, presented a distinctive histological pattern not shown by other cutaneous ulcers. The main features were epithelial hyperplasia, poor granulations, intense chronic inflammation of the dermal papillae, localization of inflammatory cells about sweat glands towards the periphery of the lesions and lack of blood vessel changes. Positive diagnosis, however, still required the demonstration of parasites.

The histopathology is discussed in detail and illustrated in 4 photomicrographs.

H. T. H. Wilson

ADLER, S. & KATZENELLENBOGEN, I. **The Problem of the Association between Particular Strains of *Leishmania tropica* and the Clinical Manifestations produced by them.** *Ann. Trop. Med. & Parasit.* 1952, May, v. 46, No. 1, 25–32. [18 refs.]

On the one hand, the existence of various strains of *Leishmania tropica* cannot be questioned ; on the other, a variety of clinical types of oriental sore have been described, of which some show a marked tendency to ulcerate whereas others do not. The Russian workers, however, were the first to claim that correlation existed between the different serological strains of *L. tropica* and the clinical variety of the lesion produced. Further, they have suggested that there are morphological differences between the different strains and have given the names *L. tropica* var. *major* and *L. tropica* var. *minor* to the strains producing the " wet " acute type of oriental sore with a short (1–6 weeks) incubation period and the " dry " chronic type with a long (2–12 months) incubation period, respectively [this *Bulletin*, 1944, v. 41, 331 ; 1947, v. 44, 940].

Lastly, the Russian workers claim that *L. tropica* var. *major* is transmitted by *Phlebotomus caucasicus*, a sandfly which normally lives in the burrows of the gerbil, *Rhombomys opimus*, the natural reservoir of the strain, and rarely attacks man [*ibid.*, 1943, v. 40, 24 ; 1944, v. 41, 331].

The authors have reviewed their considerable clinical material, collected over the last 25 years, with a view to ascertaining whether the findings of the Russian workers in Central Asia are also true in other endemic areas.

Approximately 1,200 persons were inoculated with Jericho strains of *L. tropica*, of whom 500 were followed up. The incubation period was from 4–6 weeks except in 6 cases in which it was delayed from 6 to 18 months. In 20 per cent. the lesions ulcerated within 2 to 6 months whereas in the other 80 per cent. ulceration was absent or delayed longer.

The authors concluded that a single strain of *L. tropica* did not produce a uniform clinical picture in human beings, that there was no correlation whatever between incubation period and the clinical character of the lesions, and therefore that the Jericho strain or strains of *L. tropica* behave differently from the strains prevalent in Central Asia.

They also noted that *P. caucasicus* in Persia was a domestic species that fed readily on man. *L. E. Napier*

JAFFÉ, L. **Probable Polypous Form of Leishmaniasis of the Nose.** Reprinted from *Practica Oto-Rhino-Laryngol.* 1952, v. 14, No. 1, 14–18, 3 figs.

The nasal lesions of muco-cutaneous leishmaniasis occur as ulcerating and destructive, infiltrative, atrophic, and polypoid forms, of which the last is the least common. The case here described is probably an instance of the last, diagnosed on clinical grounds, because the laboratory examinations, including the histology, were not conclusive. The patient was a Negress from Jamaica, admitted to the United Fruit Company's hospital in Almirante, with a tumour the size of a walnut protruding from the right nostril, bleeding very readily ; a history of nasal obstruction extending over the previous 2 years was given. There was also an ulcer on the left side of the nasal septum and an old lesion, with loss of tissue, of the helix of the left ear. The Kahn test gave a doubtful reaction, and a V.D.R.L. flocculation test later was negative. The tumour was removed by a cold snare ; as stated above, histological findings were not conclusive but subsequent treatment with antimonials resulted in complete cure. During 6 months 72 cc. of Repodral were injected intramuscularly and 2·1 gm. of atebrin (mepacrine) in 21 tablets, each of 0·1 gm., were given by mouth. No local or anti-syphilitic treatment was given. *H. Harold Scott*

SILVA, Y. P. Lomidine no tratamento de leishmaniose tegumentar. [**Cutaneous Leishmaniasis treated with Lomidine**] *Hospital.* Rio de Janeiro. 1952, Aug., v. 42, No. 2, 261–8, 10 figs.

The author gives details and photographs of 9 patients, in Salvador, Bahia, with cutaneous leishmaniasis. Their ages were from 12 to 50 years : 5 had had previous treatment with antimony.

The dose of lomidine was 2·5 mgm. per kgm. body weight for adults. The preparation used was made up in ampoules of 5 cc. of a 2·5 per cent. solution of the active base, and intramuscular injections were given daily or on alternate days, up to 10 injections. In two cases, signs of intolerance (pallor, fall in blood pressure, nausea, etc.) occurred : this was probably due to too rapid administration. In the other cases tolerance was good. In some cases, the series was repeated after an interval of 2–3 weeks.

The results were very satisfactory. It is suggested that lomidine should be used in cases resistant to antimony or arsenic, or where these drugs are contra-indicated. *H. J. O'D. Burke-Gaffney*

See also p. 120, SENECA, KANE & ROCKENBACH, **Protozoicidal Properties of Rimocidin.**

FEVERS OF THE TYPHUS GROUP

LEWTHWAITE, R. **The Typhus Group of Fevers.** *Brit. Med. J.* 1952, Oct. 11 & 18, 826–8 ; 875–6, 1 fig.

From his own extensive experience of the subject, Dr. Lewthwaite has given a comprehensive and authoritative account of the typhus group of fevers. He reminds readers that as recently as 25 years ago, " typhus fever was thought to be a single entity " : to-day it is known that there are 8 and possibly 12 individual members of this complex group of typhus-like fevers, and some are prevalent in each of the 5 continents. Originally, only those fevers were included in the group which gave a positive Weil-Felix reaction : but since two recently-discovered rickettsial fevers, Q fever and rickettsialpox, do not produce agglutination to known strains of *Proteus X* in convalescent serum, there is a tendency to refer to the group as " rickettsial fevers ".

The author gives the classification now regarded as being most satisfactory, namely louse-borne, flea-borne, tick-borne and mite-borne types. He then discusses each in turn, giving their numerous synonyms, clinical, pathological, epidemiological and aetiological features, their diagnosis and control. Particular interest attaches to the final section on therapy and trials of prophylaxis, in which Dr. Lewthwaite himself has played so active a part. The action of chloramphenicol, aureomycin and terramycin is discussed and special reference is given to the well-known work on the first-named antibiotic by SMADEL *et al.* in Malaya in 1947. The author notes the unexpected finding that relapses never occurred in those receiving chloramphenicol after the 7th day while they did occur in those treated in the first few days, but in these cases response eventually followed. From this and laboratory observations, it was concluded that chloramphenicol is rickettsiostatic only and that it suppresses the organism for about a week during which time the patient develops his own protective mechanism. Only in those treated late has this mechanism progressed enough for the added suppressive effect of the antibiotic to produce a complete immunity. Brief reference is made to the use of aureomycin and to trials with terramycin.

Dr. Lewthwaite has performed a great service to medical practitioners and laboratory workers in Britain in bringing together the known facts of a subject which, because of our increasing military commitments overseas, is assuming a greater importance for them. *H. J. O'D. Burke-Gaffney*

KALRA, S. L. **Natural History of Typhus Fevers in India.** *Indian J. Med. Sci.* 1952, Sept., v. 6, No. 9, 569–75. [21 refs.]

A general review.

GIROUD, P., LE GAC, P. & LE HÉNAFF, A. Enquête épidémiologique comparative sur les rickettsioses chez les habitants de deux villages des savanes de l'Oubangui-Chari, l'un situé sur une route de transit, l'autre éloigne de tout passage. [**A Comparative Epidemiological Enquiry into the Rickettsioses of the Savannahs of Oubangui-Chari in Two Villages ; One Situated on a Thoroughfare, the Other at a Distance from any Road**] *Bull. Soc. Path. Exot.* 1952, v. 45, No. 4, 447–9.

The hypersensitivity test was used for the detection of antibodies of epidemic typhus, murine typhus, boutonneuse fever and Q fever. In village A on the main road 50 of the 300 inhabitants were tested and in village B 30 of the 200

inhabitants, all of whom were engaged in hunting buffaloes and deer. The positive findings were as follows :—

		Q fever	Boutonneuse fever	Murine typhus	Epidemic typhus
Village A	Cultivators (33) ..	11	2	2	0
	Fishermen (7) ...	4	3	2	0
	Hunters (10) ...	7	7	7	3
Village B—Hunters (30) ...		2	17	15	6

The findings suggest to the authors that Q fever is imported by flocks travelling along the main road and that boutonneuse and murine typhus infection are indigenous diseases of the animals of the locality.

The positive reactions with epidemic typhus antigen are not regarded as significant ; they occur in persons allergic to murine and boutonneuse antigens and do not necessarily indicate a previous attack of epidemic typhus.

[But see this *Bulletin*, 1952, v. 49, 1106, where Giroud *et al.* suggest that the cattle of Oubangui-Chari may be reservoirs of infection with epidemic typhus.]

John W. D. Megaw

FAURE. Endocardite infectieuse et typhus exanthématique. [**Infective Endocarditis and Epidemic Typhus**] *J. Méd. de Bordeaux.* 1952, Oct., v. 129, No. 10, 840–43.

See also this *Bulletin*, 1950, v. 47, 613, 971.

WEYER, F. **The Behavior of *Rickettsia akari* in the Body Louse after Artificial Infection.** *Amer. J. Trop. Med. & Hyg.* 1952, Sept., v. 1, No. 5, 809–20, 7 figs. [13 refs.]

A strain of *Rickettsia akari* in peritoneal exudate of experimentally infected mice, or in the blood of infected mice, multiplied rapidly when inoculated intrarectally into the body louse. The multiplication occurred only in the cells of the midgut which became swollen and vacuolated ; some of the cells ruptured, discharging large numbers of rickettsiae into the lumen of the gut, but in most cases the damage to the gut was not enough to affect the health of the lice.

With intracoelomic inoculation of the lice similar multiplication occurred from the 5th or 6th day, reaching a high degree of intensity on the 8th to the 10th day and soon causing the death of the insects. The multiplication in the coelom was mostly extracellular but concentrations of rickettsiae were often seen in or on blood cells.

Repeated rectal passages were made with suspensions of the stomachs of the lice and with infected coelomic fluid ; there was no loss of virulence or pathogenicity for mice.

No reactions occurred in any of the workers on whom the infected lice were allowed to feed. Clean lice refused to feed on laboratory animals so that there was no experimental evidence of the infection of lice by swallowing infected blood, but the author felt sure that such infection could occur.

The final conclusion of the author is " The behavior of *R. akari* in the louse can best be explained by its close relationship to other rickettsiae, if we suppose that the capacity to develop in arthropods is a fundamental characteristic of all rickettsiae and that the different species of rickettsiae all have a common origin ".

John W. D. Megaw

Rosenblum, M. J., Masland, R. L. & Harrell, G. T. **Residual Effects of Rickettsial Disease on the Central Nervous System. Results of Neurologic Examinations and Electroencephalograms following Rocky Mountain Spotted Fever.** *Arch. Intern. Med.* 1952, Oct., v. 90, No. 4, 444–55, 8 figs. [Refs. in footnotes.]

In this study of the after effects of Rocky Mountain spotted fever it was found that 21 of the 37 patients who were examined 1–8 years after the illness still showed evidence of neurological damage which appeared to be attributable to the disease. Symptoms, complained of by 14 of the patients, included headache, nervousness, backache, emotional lability, loss of memory, convulsions, weakness and "inability to enjoy life". In 6 cases there were physical signs of such abnormalities as impairment of fine movements, hypotonia, increased reflexes, Babinski's sign, ankle clonus, disturbance of gait or behaviour, mental retardation and asymmetry or weakness of muscles.

Electrocardiographic examinations were made; in 12 patients there were definite abnormalities; in 12 there were borderline abnormalities and the remaining 13 were clearly normal. An unduly large proportion of the various abnormalities occurred among the patients whose illnesses had lasted longest; there was a less definite association between the incidence of the changes and the severity of the attacks.

Among the 13 patients who had been treated with aureomycin or chloramphenicol 6 had definite abnormalities; among the 24 who did not receive these drugs the number found abnormal was 14 and the average severity of the sequelae was higher. Only one of the 7 patients who had received the antibiotics within 3 days of the appearance of the rash had an abnormal electroencephalogram.

A histological examination was made of the brain in 6 other cases in which death occurred during the illness; in all of these microscopical infarcts or granulomas associated with damage to the blood vessels were found.

The authors conclude that damage to the central nervous system is common in the disease and that in some cases residual damage persists longer than one year and may be assumed to be permanent.

The paper is illustrated by 5 photomicrographs and 3 electroencephalograms.

John W. D. Megaw

Payzin, S. & Akkay, N. **Natural Occurrence of *Coxiella burneti* in *Ornithodorus lahorensis* Ticks.** *Türk Ijiyen ve Tecrubi Biyoloji Dergisi.* Ankara. 1952, v. 12, No. 1, 17–19. [17 refs.] [Fuller version in Turkish 8–16.]

"1. Two out of 50 samples (more than 300 ticks) of O. lahorensis—approximately 4 p.c.—have been found naturally infected with C. burneti.

"2. The rôle of O. lahorensis ticks in the epidemiology of Q fever in Turkey is discussed."

Lee, P. E. **Examination of Raw Milk for *Coxiella burneti* in the Greater Brisbane Area of Queensland.** *Med. J. Australia.* 1952, Aug. 30, v. 2, No. 9, 303–4, 1 fig.

"1. The investigations, so far as they have gone, have not disclosed an endemic focus of 'Q' fever within Greater Brisbane, although previous work has shown that there are endemic areas in the countryside north and south of Brisbane.

"2. It seems unlikely that the raw milk supply is a significant source of human infection with 'Q' fever in Brisbane, which is in accord with Derrick's observations on the occupational incidence of the disease."

WINN, J. F. & ELSON, B. E. **Effects of Feeding Colostrum containing *Coxiella burnetii* Antibodies to Newborn Calves of Two Categories.** *Amer. J. Trop. Med. & Hyg.* 1952, Sept., v. 1, No. 5, 821–5. [13 refs.]

Little or no complement-fixing antibody for Q fever was found at birth in 3 calves of cows which at parturition and 2 months previously had given positive reactions at titres of 1-64 with the fixation test. The calves were fed on colostrum from 3 other cows which gave consistently positive reactions on 3 occasions at titres of 1-32 or over, and the samples of colostrum reacted at titres of 1-64 or 1-256. The amount of colostrum given ranged from 0·36 to 3·84 litres in 2 days. Each calf developed complement-fixing antibodies at titres of 1-32 or 1-64. In one calf a titre of 1-64 was reached one day after birth ; in another this titre was reached in a week and in the third the titre was 1-32 after a month.

Four calves of cows with persistently negative reactions were fed on the same colostrum but none of them developed a positive reaction at any time.

Numerous specimens of blood from the reacting cows and calves, and of the serologically-positive colostrum, were inoculated into guineapigs, with negative results.

It is mentioned that HUEBNER *et al.*, in unpublished experiments, failed to infect any of 75 serologically negative cows by feeding them on infected milk, and found that the calves of serologically positive dams usually became positive after birth even though they were bucket-fed and in many instances did not suckle their own dams.

The authors suggest intra-uterine infection as a distinctly possible explanation of the presence of antibodies in the 3 calves with positive reactions.

[If, as seems likely from the findings of Huebner *et al.*, this is the correct explanation, the feeding of the calves on colostrum from serologically positive cows would be an irrelevant factor.] *John W. D. Megaw*

BINGEL, K. F. & ENGELHARDT, H. Genügen unsere Pasteurisierungsverfahren zur Unschädlichmachung des Q-Fieber-Erregers in der Kuhmilch ? [**Do our Methods of Pasteurization give Adequate Protection against Harmful Effects of Q Fever Rickettsiae in Cows' Milk ?**] *Arch. f. Hyg. u. Bakt.* 1952, v. 136, No. 6, 417–25, 1 fig.

The authors describe a large series of carefully controlled experiments by which they have confirmed the findings of several other workers who have shown that *Coxiella* [*Rickettsia*] *burneti* may survive in milk after the usual methods of heat treatment. Sterilized milk was artificially infected with large doses of virulent cultures of the rickettsiae ; samples were exposed to varying temperatures for different periods and then tested by inoculation into the testicles of guineapigs and yolk-sac cultures. Heating to 100°C. for 7 seconds caused complete sterilization, but exposure to 85° for periods ranging from 5 to 28 seconds failed to kill all the rickettsiae though so short an exposure as 7 seconds at this temperature caused a fall in virulence comparable to that resulting from a reduction of the infecting dose of untreated infective milk to 1-1,000 of the amount employed in the tests.

Similar results followed heating the milk to 75° for 40–80 seconds, to 70–71° for 40–80 seconds, and to 62° for 30 minutes.

Guineapigs inoculated with these incompletely sterilized samples of milk did not develop significant rises of temperature but they were later found to have acquired as high a degree of immunity as animals convalescent from attacks caused by full doses of untreated infective milk.

The authors conclude that the standard methods of heat treatment give adequate protection against the risk of harmful infection from milk and that even if inapparent infection should occur this would be protective against later infection with Q fever.

[References to previous studies of this problem will be found in this *Bulletin* as follows : Ransom *et al.*, 1951, v. 48, 545 ; Huebner *et al.*, *ibid.*; Marmion *et al.*, *ibid.*, 1100 ; Lennette *et al.*, 1952, v. 49, 766.] *John W. D. Megaw*

BARTONELLOSIS

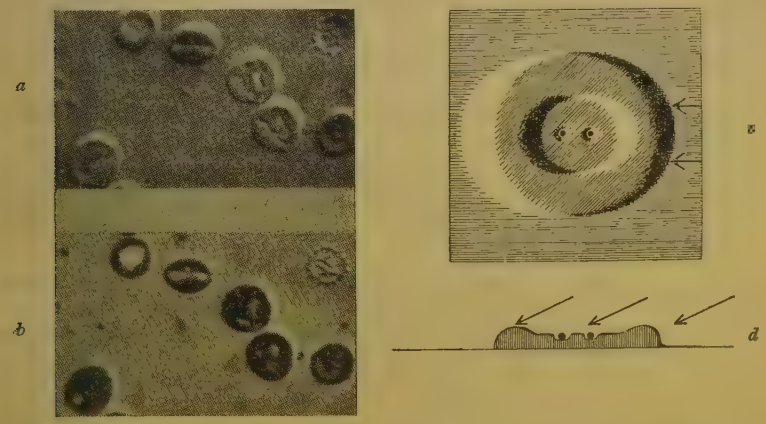
Wigand, R. & Peters, D. Neuere Untersuchungen über *Bartonella muris* Mayer (2. Mitteilung). [**New Investigations of** *Bartonella muris* **Mayer (Part 2)**] *Ztschr. f. Tropenmed. u. Parasit.* Stuttgart. 1952, May, v. 3, No. 4, 437–52, 15 figs. [41 refs.]

Descriptions of the morphology of *Bartonella muris* have already been published by the authors [this *Bulletin*, 1951, v. 48, 141]. In this article the work has been extended to the appearance of the organism when viewed by phase-contrast microscopy. Blood was obtained from splenectomized rats and mice, and from hamsters which had been artificially infected.

In fresh, unhaemolysed blood *Bartonella* shows as dark coccoid bodies, feebly motile, but only the specimens in cells which have been accidentally haemolysed can be seen. The infection thus appears very scanty. When haemolysed blood is examined, the number visible is as great as in stained preparations, but no signs of movement can be made out.

To study the appearance of *Bartonella* lying on the surface of the cell (as does *Eperythrozoon coccoides*) dried films were " shadowed " with palladium and examined by bright-field microscopy. Unexpectedly it was found that the organisms do not project above the level of the red cell, but lie in depressions.

[The appearances are clearly shown in the photomicrograph and diagram reproduced herewith.]



a. Unstained blood film " shadowed " with Palladium : bright-field microscope. *b.* The same field, stained with Giemsa. *c.* Sketch of " shadowing " of an erythocyte with 2 *Bartonella*, top view. *d.* The same, side view in section. [Reproduced from *Zeitschrift für Tropenmedizin und Parasitologie.*]

A further series of photographs of electron-microscopical preparations illustrate the various forms which were described in the earlier paper.

J. C. Broom

WIGAND, R. Neue Untersuchungen über *Bartonella bacilliformis*. 2. Mitteilung: Verhalten gegenüber Sulfonamiden und Antibiotica *in vitro*. [**New Investigations of *Bartonella bacilliformis*. Part 2. Action of Sulphonamides and Antibiotics** *in vitro*] *Ztschr. f. Tropenmed. u. Parasit.* Stuttgart. 1952, May, v. 3, No. 4, 453–60. [50 refs.]

Because of the therapeutic effect of antibiotics in cases of Oroya fever, an investigation was made of the action on 3 strains of *Bartonella bacilliformis* of penicillin, dihydrostreptomycin, aureomycin, chloramphenicol, terramycin, sulphathiazole, Supronal, and Gantrisin (3,4-dimethyl-5-sulphanilamido-isoxazol). Appropriate ranges of concentrations were made in a semi-solid culture medium, and 2 tubes of each concentration of drug were seeded with each of the strains. The cultures were incubated at 26°C., and the growth present after 2, 3 and 4 weeks was compared with that of control cultures.

The sulphonamides were relative ineffective. Supronal partially inhibited growth at 0·4 mgm. per ml., but 10 mgm. per 1 ml. of the other two were required to produce inhibition. One of the strains appeared to be less resistant than the others, but it was used in some of the tests only.

The antibiotics were much more active. Complete inhibition occurred with the following concentrations per ml.:—aureomycin and chloramphenicol, 10 μgm.; penicillin, 1·0 μgm. (= 1·66 units); terramycin, 0·1 μgm.; dihydrostreptomycin, 0·05 μgm.

In view of these findings the author suggests that combined treatment with two or more antibiotics is likely to give most satisfactory results in Oroya fever and verruga peruana.

J. C. Broom

YELLOW FEVER

See also p. 174, MAY, **Map of the World Distribution of Dengue and Yellow Fever.**

HADDOW, A. J. **A Review of the Results of Yellow Fever Protection-Tests on the Sera of Primates from Kenya.** *Ann. Trop. Med. & Parasit.* 1952, Sept., v. 46, No. 2, 135–43, 1 map. [13 refs.]

Evidence is presented which suggests that in the driest parts of Uganda and in Kenya, galagos (bush-babies) and not monkeys may be the main mammalian hosts of yellow fever virus. From the results of all tests made on the sera of bush-babies and monkeys taken in Kenya, yellow fever neutralizing antibody was found in 5/344 (1·5 per cent.) monkey sera and 14/103 (13·6 per cent.) bush-babies. Since some of the monkeys may have come from areas where virus is not active, and as all the bush-babies came from known infected areas, further comparisons of the immunity rates in monkeys and bush-babies were made in areas in Kenya where the presence of yellow fever has been established. In the Coast Province the rates for monkeys and bush-babies were 3/113 (2·7 per cent.) and 14/102 (13·7 per cent.)

respectively, and confining the sample closely to the 4 actual areas in Kenya where the presence of animal yellow fever has been established, the difference is again very striking, the rate being 1·8 per cent. in the monkeys (5/271) and 17·3 per cent. (14·81) in the bush-babies (almost 10 times the monkey rate).

A preliminary survey of primates in the Karamoja district of Uganda showed that 0/28 monkeys and 7/23 galagos had antibody.

These findings suggest that the animal disease in Kenya is likely to be different from that of the Uganda forest cycle [Haddow, Smithburn, Dick, Kitchen and Lumsden, this *Bulletin*, 1949, v. 46, 457 ; Smithburn, Haddow and Lumsden, *ibid.*, 823] for all species of bush-babies become active at dusk and therefore probably form poor hosts for mosquitoes, compared with sleeping monkeys. Their sleeping habits during the day protect them considerably from mosquito bites and it seems unlikely that mosquitoes can play a major part in any yellow fever cycle in which spread from bush-baby to bush-baby is involved.

Haddow draws attention to the fact that about 11 per cent. of sera from *Galago crassicaudatus* gave inconclusive results in protection tests and suggests that (1) the antibody response to yellow fever virus may be poor in a certain percentage of bush-babies, but that this does not seem likely from the results of experimental infections [with which the reviewer concurs] or that (2) with time there may be a gradual diminution of antibody level. [While this is possible, it does not seem likely from experimental studies of other African primates. Another possibility is that galago sera contain a non-specific neutralizing substance or antibody to an immunologically related virus. It would be of importance to investigate this possibility. It would furthermore seem important to use a 10 or 20 per cent. virus suspension rather than 1 per cent. in yellow fever surveys. The use of a higher concentration of virus would eliminate a number of inconclusive false-positive reactions. One might miss a few immune animals but for survey work it is of more importance perhaps to reduce the number of inconclusive results. Furthermore, in view of the small quantity of sera available from bush-babies it might be worth considering testing dilutions of serum, thereby conserving sera for further tests. Finally the reviewer wonders whether the finding of 2 of 164 monkeys in the Nairobi area (with antibody demonstrable in the 1 per cent. virus test) is conclusive evidence of the presence of animal yellow fever in that area. Thus 2 of 876 human sera from Asia and Australia where yellow fever has never been known to be present were shown by Sawyer *et al.*, this *Bulletin*, 1937, v. 34, 680, to neutralize yellow fever virus.

This is an interesting and important contribution and further studies of bush-babies and their habitats and parasites may help to elucidate the "dry country"—yellow fever problem. It is also of importance in suggesting that yellow fever may even exist in an area without evidence of infection of monkeys or man.] *G. W. A. Dick*

Elton, N. W. Fiebre amarilla en América Central. La naturaleza de la fiebre amarilla selvática y su antecedente historico. [**Nature and History of Jungle Yellow Fever in Central America**] Reprinted from *Archivos Med. Panameños.* 1952, v. 1, No. 3, 189–95. [14 refs.]

[See this *Bulletin*, 1952, v. 49, 684.]

RABIES

i. Péllissier, A. & Trinquier, E. A propos d'une épidémie de rage canine survenue à Brazzaville. [**An Outbreak of Canine Rabies at Brazzaville**] *Ann. Inst. Pasteur.* 1952, Sept., v. 83, No. 3, 410–11.

ii. —— & ——. Présence chez certains animaux de laboratoire d'inclusions neuronales cytoplasmiques colorées en rouge par le Mann pouvant simuler des corps de Negri et différenciées par l'hématoxyline de Mallory. [**Presence in Neurones of Certain Laboratory Animals of Inclusions Stained Red by Mann's Stain which Simulated Negri Bodies and were Differentiated by Mallory's Haematoxylin**] *Ibid.*, 412–13.

i. In 1951, an epizootic of rabies occurred in Brazzaville. Altogether 169 biting animals (all but 4 were dogs) were observed by the Veterinary Department and 62 died. The authors examined the brains of 70 of the remaining biting animals, details of which are given in a table : rabies was confirmed histologically in 51, it was suspected in 16 and excluded in 3. In most of the positive cases Negri bodies were well-marked and numerous.

The authors refer to two points of special interest arising out of this experience. The first is the value of staining the Negri bodies with Mallory's phosphotungstic haematoxylin ; the differentiation is better than that with Mann's stain, as the Negri bodies differ in colour from the red blood corpuscles and from nucleoli : these last two are respectively stained a clear violet-blue and a metallic dark blue, in contrast with yellowish-red colour of the Negri bodies [see below].

The second point of note refers to rabies in a biting animal in which the usual histological methods failed to demonstrate Negri bodies, and produced a minimum of evidence. Nevertheless, the suspicion was considered sufficient for the administration of anti-rabies treatment.

Details are given of the dog which died of clinical rabies, with no post-mortem evidence other than diffuse congestion of the brain. Passage in four guineapigs produced paralysis and death, but no Negri bodies : on the other hand, lesions in Ammon's horn suggested fixed rabies. Finally, passage in a rabbit produced the same evidence, but, in addition, confirmed the presence of a few Negri bodies.

ii. In 1950, before Mallory's haematoxylin was used by the authors, Péllissier found in certain nerve-cells of the brain of a monkey infected with virus from a human case of epidemic jaundice, several round bodies staining bright red by Mann's stain : they were most marked in degenerate neurones [*Bulletin of Hygiene*, 1951, v. 26, 442].

The authors have since found similar bodies, twice in guineapigs and once in a monkey in different parts of the neurones of the horn of Ammon and elsewhere in the brain. The bodies usually measure 0·2 to 1 μ, but may be 2 to 3 μ. By Mallory's method they stain a dark metallic blue.

They describe briefly 8 preparations, 2 from a monkey and 4 from a guineapig with encephalo-myelitic lesions, and two from a guineapig with experimental street rabies. These showed numerous Negri bodies stained lilac-red with Mann's stain and yellowish-red with Mallory's : the shade in the latter case is rather darker than that of the cytoplasm. Side by side, sometimes in the same nerve-cell, they found the round inclusions referred to above which stained bright red with Mann's stain and dark blue with Mallory's. Some were 2–3 μ in diameter and, with Mann's stain alone, exactly simulated Negri bodies.

In explaining these bodies, the authors recall preparations shown to them by Dr. Field, when working with Dr. Lépine in 1950. This worker produced analogous bodies in the ganglion cells of the spinal cord of rabbits by irritation of the sciatic nerve. It is suggested that this is a non-specific defence mechanism

to different irritants exhibited by the nerve cells. The differential value of Mallory's stain in such cases is stressed. *H. J. O'D. Burke-Gaffney*

Starr, L. E., Sellers, T. F. & Sunkes, E. J. **Apparent Recovery of a Dog from Rabies.** *J. Amer. Vet. Med. Ass.* 1952, Oct., v. 121, No. 907, 296.

" This is a report of an apparent recovery from rabies after the development of clinical symptoms, in which the clinical diagnosis of rabies was confirmed by laboratory examination and recovery of the virus from the brain tissue and salivary gland. It is unfortunate that circumstances made it necessary to destroy the dog before a longer period of observation could have been used to establish conclusive proof of recovery from the disease."

Yaoi, H., Takei, M. & Maeda, H. **Studies on the Rabies Vaccine. VIIth Report : on an Assay Technique of Anti-Rabies Vaccine.** *Yokohama Med. Bull.* 1952, Feb., v. 3, No. 1, 15–26. [29 refs.]

Yaoi *et al.* describe a test for rabies vaccines, in which 3 doses of 0·25 ml. vaccine are given intraperitoneally every second day to 4-week-old mice which are challenged 1 week after the first inoculation. All the experiments show that protection is greatest in the first and second weeks and that it then falls off. They also show that minute differences in the quantity of vaccine used greatly influence the protection afforded by the vaccine.

[The reviewer is of the opinion that the results presented may be indicative of a vaccine with a sufficient amount of live virus to interfere with subsequent challenge and that interference and not immunity is being measured in the animals challenged soon after vaccination.] *G. W. A. Dick*

PLAGUE

May, J. M. **Map of the World Distribution of Plague.** Reprinted from *Geographical Rev.* 1952, v. 42, No. 4, 628–30, 5 coloured maps on folding pl.

The known distribution of plague from 1900 to 1952 is clearly shown in red on 5 excellent maps on a single large sheet which is folded for convenience. Four of the maps dealing with the distribution of human and wild-rodent plague are on the scale of 1 in 30,000,000, the 5th map is on a smaller scale, it shows the seasonal distribution of the disease in most of the important plague-infected areas.

It has been possible, without loss of clearness, to include information on the dates of introduction of the disease to the affected countries and on the number of cases occurring in a given year or period in towns or provinces specially ravaged at some time. The names of seaports in which cases have occurred since 1945 are shown in red. A useful feature is the inclusion of a table showing for each country the domestic and wild rodents known to be specially important vectors, and the chief arthropod vectors.

A map of this kind has necessarily certain limitations and the epidemiological survey of the disease is far from complete in many parts of the world. This is specially true of the distribution of wild-rodent infection, which is probably much wider than is shown. For example, since the map was prepared Kenya has been shown to have important foci of sylvatic plague [see below, 1953, p. 110].

The author of the map, Dr. Jacques M. May, and The American Geographical

Society of New York deserve the congratulations and thanks of all those engaged in the study and teaching of the epidemiology of plague.

John W. D. Megaw

HEISCH, R. B. **Wild-Rodent Plague in Kenya.** *Trans. Roy. Soc. Trop. Med. & Hyg.* 1952, Sept., v. 46, No. 5, 547–9.

In this important preliminary note the author begins by stating that ROBERTS in a recent study reached the conclusion that *Rattus rattus* was the only rodent concerned with the transmission of plague in Kenya [see this *Bulletin*, 1950, v. 47, 736].

In the present paper a description is given of the isolation by guineapig inoculation of 8 strains of *Pasteurella pestis* from 31 pools of spleen suspension made from a total number of 660 *Arvicanthis abyssinicis* caught in fields in the Rongai area of Kenya. Other strains isolated in the area were :— 3 from 20 pools made from 280 multimammate mice, *Mastomys coucha ;* 2 from 3 pools of 23 *Rhabdomys pumilio* caught near native huts ; and 2 from 8 pools of 89 *Otomys angoniensis.* In some cases suspensions of fleas were included in the pools. More strains would almost certainly have been isolated if more and smaller pools had been made. One strain was isolated from a pool of 21 fleas, *Dinopsyllus lypusus* collected from a burrow containing 3 desiccated corpses of *Arvicanthis.*

About 18 bone-marrow pools were tested with negative results and the author thinks that this method may have only a limited value in making surveys of rodent infection, especially when this is latent or inapparent as seems often to be the case.

Other points of interest were that digging the burrows of the rodents and catching by hand were more satisfactory than trapping, and that both *A. abyssinicus* and *M. coucha* were found in burrows previously occupied by *R. rattus* of which desiccated corpses were found ; one of these burrows was in a plague infected village where *R. rattus* had been almost completely exterminated. *X. cheopis* was found in large numbers on wild and domestic rodents.

All the strains of infection were tested by standard methods and were found to belong to the variety which DEVIGNAT has called *P. pestis antiqua* [see *ibid.*, 1952, v. 49, 45]. The author concludes that plague infection is firmly entrenched among the wild rodents round Rongai and that they are playing an important part in propagating and perpetuating the disease.

John W. D. Megaw

GOLEM, S. B. & ÖZSAN, K. Différences biochimiques entre les souches turques de *Pasteurella pestis.* [**Biochemical Differences among Turkish Strains of** *Pasteurella pestis*] *Türk Ijiyen ve Tecrübi Biyoloji Dergisi.* Ankara. 1952, v. 12, No. 1, 52–5. [Fuller version in Turkish 29–51. (57 refs.)]

The biochemical characteristics of four strains of *Pasteurella pestis* are described ; 3 of the strains came from coastal towns in Turkey and gave the biochemical reactions of Variety I, *P. pestis orientalis* in the classification of DEVIGNAT [see this *Bulletin*, 1952, v. 49, 45].

The fourth strain came from a village 5 kilometres north of the Turco-Syrian border where an outbreak believed to be of the sylvatic type occurred in March and April, 1947. This strain belonged to Devignat's Variety III, *P. p. mediaevalis*, which ferments glycerine, does not produce NO_2 and does not reduce nitrates to nitrites. The same type has been isolated by BALTAZARD and ASLANI in Kurdistan, not far from the Turkish border [see this *Bulletin*, 1953, v. 50, 26].

John W. D. Megaw

See also p. 163, YASUMATSU, **Rearing of Flea Larvae on various Diets.**

POLLITZER, R. **Plague Studies. 5. Methods of Laboratory Diagnosis.** *Bull. World Health Organization.* Geneva. 1952, v. 6, No. 3, 317–49. [109 refs.]

This is the 5th of a series of plague studies which, when complete, will form a Manual to be published in English and French. It deals with methods of laboratory diagnosis of human and rodent infection. Like the 4 previous studies it is a concise critical summary of existing knowledge of the subject with which it deals. A valuable feature is the bibliography which contains 109 references.

The matters dealt with are :—the isolation and confirmation of infection among rodents and their fleas ; laboratory methods of diagnosis in human patients during life and after death ; methods of preserving materials collected from wild and commensal rodents for laboratory examination ; a synopsis of diagnostic and differential diagnostic methods for the identification of *Pasteurella pestis*, including serological tests and the use of bacteriophages and hints on the precautions advisable for workers in the field and laboratory when exposed to the risk of infection. [For abstracts of the preceding 4 studies, see this *Bulletin*, 1952, v. 49, 388, 616, 690, 857.]

John W. D. Megaw

GIRARD, G. Le traitement de la peste pulmonaire par les antibiotiques fungiques. A propos de 25 cas traités à Madagascar. [**The Treatment of Pneumonic Plague by Fungal Antibiotics**] *Rev. Coloniale de Méd. et Chir.* 1952, Oct. 15, v. 24, No. 206, 174–80. [10 refs.]

This is a useful summary of the results obtained by various workers in Madagascar in the treatment of proved cases of primary pneumonic plague with streptomycin, chloromycetin (chloramphenicol) and terramycin.

The paper is, for the most part, a preview of articles under publication by the workers concerned, so that only a brief statement of the chief findings will be given.

Among 10 cases treated by MERCIER in Tananarive early in 1951 with streptomycin, with a total dosage of 12 to 20 gm. intramuscularly, there was only one death, which occurred a month after the onset and was due to a secondary infection which did not yield to penicillin or any of the other antibiotics. In all the cases there was a rapid disappearance of the plague bacilli from the sputum.

Among 8 cases occurring in the same outbreak but treated elsewhere there were 3 deaths of patients admitted on the 3rd day and surviving for only a few hours.

In January, 1952, a patient was treated by MERCIER and MCCRUMB ; 3 doses of 0·5 gm. injectable chloromycetin were given intravenously together with similar doses of the drug by the mouth, at intervals of 3 hours ; the rest of the treatment was oral and altogether about 20 gm. were given with results comparable to those obtained with streptomycin. A similar line of treatment with terramycin was equally successful in 2 cases.

Mercier treated 5 further patients with chloromycetin without a death and he is quoted as regarding the three antibiotics tested as being of equal value.

The injectable preparations of chloromycetin and terramycin are not yet on the market ; Mercier suggests that streptomycin might be given for the first 24–36 hours, followed by one of the other two drugs by the mouth. Aureomycin was not tested. *John W. D. Megaw*

AMOEBIASIS AND INTESTINAL PROTOZOAL INFECTIONS

ELSDON-DEW, R. & FREEDMAN, L. **Intestinal Parasites in the Natal Bantu.** *South African J. Clin. Sci.* Cape Town. (Incorporating *Clin. Proc.*) 1952, June, v. 3, No. 2, 59–65, 1 fig.

Following up the observations already recorded on the incidence of protozoal and helminthic parasitism in the local population in Durban, S. Africa [this *Bulletin*, 1948, v. 45, 189] the authors have now examined stools (*a*) from about 500 Africans newly arriving in the city, and (*b*) from 500 others who have been in it for some time. A single stool specimen only was obtainable from each patient, and this was examined by direct microscopy, and after a zinc-sulphate flotation technique. The results are set out in a table ; from these results the authors conclude that though the total incidence of infection does not alter, the ratio of those passing cysts of *Entamoeba histolytica* to those passing amoebae increases with residence in the city; and that the incidence of infection with *Trichuris trichiura* doubles after a stay there. The over-all incidence of *E. histolytica* infection determined by the examinations was just over 5 per cent. ; as the authors consider that their technique reveals 70 per cent. of infections with this parasite on a single examination, its true incidence in Natal Africans they consider to be about 10 per cent. which is a considerably lower figure than has been recorded from many other parts of the world.

The inter-relationship and association of the various parasitic infections have been analysed by determination of their theoretical and observed frequencies, and there is considered to be a significant association between some protozoal infections, for example *E. histolytica*, *E. coli* and *Endolimax nana*. There was a relation between *Ascaris* and *Trichuris* incidences, but none between these and the protozoal infections.

The authors consider that their results confirm the great value of the zinc sulphate concentration technique in disclosing all parasitic infections of the bowel, with the exception of those due to *Schistosoma mansoni* and *Strongyloides*.

The findings are given in 6 detailed tables and one figure. [See also this *Bulletin*, 1950, v. 47, 538 ; 1951, v. 48, 463.] *A. R. D. Adams*

SHAFFER, J. G. **Studies on the Growth Requirements of *Endamoeba histolytica*. V. Studies on the Nature of some of the Factors in the Shaffer-Frye Medium that affect the Propagation of *E. histolytica*.** *Amer. J. Hyg.* 1952, Sept., v. 56, No. 2, 119–38, 9 figs. [10 refs.]

Entamoeba histolytica of various strains was grown in the following way : 2·5 cc. supernatant fluid of a centrifuged culture (in fluid thioglycollate medium with 1 per cent. glucose and rice starch) of a special streptobacillus (*Bacteroides*) were added to 0·1 cc. horse serum and 0·7 cc. normal saline plus 1,000 units of penicillin ; amoebae were introduced and the medium was layered with vaseline prior to incubation. Streptobacilli remained in the culture but did not multiply. All results were measured quantitatively, with the use of a cerebrospinal fluid counting chamber.

Maximum growth was obtained after 72 hours, depending upon the size of the inoculum ; the optimum *p*H varied within narrow limits according to the strain used, and lay between 6 and 6·9.

A sediment formed in the medium after incubation, and this sediment was proved to provide an important growth factor for the amoebae. The sediment was removed by centrifugation and was then added to fresh fluid thioglycollate medium plus serum : amoebae grew well in this, but failed to grow in media

containing the supernatant fluid only. The sediment was found to contain viable streptobacilli, but these did not multiply during the period of culture. Amoebae were next grown in media containing varying numbers of streptobacilli—up to 70 million per cc., and a clear relationship was established between numbers of bacilli and propagation of the protozoon, which faded out after about 50 million. No visible evidence of phagocytosis of the bacteria was obtained.

P. C. C. Garnham

SHAFFER, J. G. & SIENKIEWICZ, H. S. **Propagation of a Strain of** *Endamoeba histolytica* **in Tissue-bearing Culture.** *Science.* 1952, Sept. 19, v. 116, 306–8.

Entamoeba histolytica was successfully grown by two methods in anaerobic tissue culture of chick embryo. In the first, 4–5-day embryos were cut into 3 or 4 segments, in the second the embryos were ground thoroughly but without an abrasive ; successful transplants every 48 hours were obtained by the first method 5 times, and by the second, apparently indefinitely, provided the concentrations of tissue suspension were high enough. Typical amoebae were visible, in between cells, in sections made of pieces of tissue ; amoebae—lying among viable isolated tissue cells—were very numerous in cultures prepared by the second method.

Later experiments showed that growth was equally good in tissue cultures of brain, liver, heart and thigh muscle of 10-day embryos, even in aerobic condition.

P. C. C. Garnham

NAKAMURA, M. **Substitution of an Enzyme Preparation for** *Trypanosoma cruzi* **in Cultures of** *Endamoeba histolytica.* *Kitasato Arch. Exper. Med.* 1952, May, v. 25, No. 1, 43–6, 2 figs.

It has been shown [this *Bulletin*, 1950, v. 47, 624, 741] that *E. histolytica* can be maintained in culture with *T. cruzi* in absence of bacteria, even after heat treatment of the trypanosomes for 10 minutes at 48°C. but not when they are heated for the same period at 50°C. The present author found that after treatment at the lower temperature the oxygen uptake of the trypanosomes was reduced and completely inhibited by treatment at the higher temperature. He therefore sought an enzyme which might function like *T. cruzi* and selected succinic dehydrogenase prepared from rabbit heart. Various methods were used to exclude bacterial contamination of the preparation, the most satisfactory being a combination of dihydrostreptomycin and penicillin. The enzyme preparation was included in the culture medium to which *E. histolytica* was added free from bacteria or trypanosomes. The mixture was sealed with petrolatum and incubated at 37°C. Transfers were made to fresh medium after 48 hours. By this means in one experiment 10 subcultures were made with abundant growth of amoebae before bacterial contamination occurred. Other experiments under the same conditions were not so successful and with fewer than 10 subcultures the amoebae disappeared. The enzyme preparation was, however, beneficial to amoebic growth since only 2 subcultures were possible without it. Experiment also showed that heat treatment of the enzyme preparation and of *T. cruzi* affected the oxygen uptake of both in similar manner, a temperature above 48°C. being harmful. The mechanism of action of the enzyme has not been elucidated.

J. D. Fulton

NAKAMURA, M. **The Significance of Oxidation-Reduction Potentials in the Cultivation of** *Endamoeba histolytica.* *Kitasato Arch. Exper. Med.* 1952, May, v. 25, No. 1, 47–50.

It has been suggested that bacteria present in cultures of *E. histolytica* may function in one of a number of ways such as providing necessary metabolites

or particulate matter for the amoebae to engulf, by supplying certain enzymes which amoebae do not possess or by producing suitable physical conditions with low oxidation-reduction potentials. Reports on the significance of oxidation-reduction potentials have been given by a number of authors. The evidence suggests that a wide range of values is consistent with multiplication and growth of amoebae. The present investigation deals with certain aspects of this subject. Cultures of *E. histolytica* in association with *T. cruzi* were used as controls, thioglycollate being incorporated in the medium and a layer of paraffin was used to exclude air. To find if thioglycollate or the paraffin seal was necessary to maintain reducing conditions cultures were set up in which one or the other or both were omitted. The resulting oxidation-reduction potential in the different media was studied by adding methylene blue and observing whether it was reduced during 10 serial subcultures. In the control tubes growth was good and the dye remained reduced. When thioglycollate or the paraffin seal was omitted growth was less good and the dye was not reduced in the upper part of the culture medium. When both factors were omitted the growth of amoebae occurred to a limited extent but the methylene blue was unreduced throughout the culture. It is therefore suggested that the main function of the trypanosomes present may be to provide growth factors for *E. histolytica* rather than low oxidation-reduction potentials. The significance of the other factors mentioned in connexion with amoebic growth was not determined. *J. D. Fulton*

YAMAGISHI, Y. **Experiments on the Encystation of** *Entamoeba histolytica in Vitro*. *Kitasato Arch. Exper. Med.* 1952, May, v. 25, No. 1, 51–5, 1 pl. [13 refs.]

Many methods of producing encystment in cultures of *E. histolytica* have been described but none has proved generally satisfactory. The present author has carried out further experiments in this field. The amoebae were maintained on a culture medium of Boeck-Drbhoiav type, prepared by inspissation of whole eggs suspended in Ringer solution to which an overlay of broth was added [no mention of starch]. Amoebae cultured in this medium were then pipetted into clean tubes with 3 to 5 ml. of overlay and several drops of normal NaOH were added with shaking, followed by 10 ml. of Ringer's solution. When sedimentation had occurred the supernatant fluid including bacteria was removed by pipette and was replaced by a volume of 10 ml. Ringer's solution so that the *p*H of the medium was 8·4 to 8·8. The cultures were then kept at 20° to 24°C. After 2 to 3 hours the presence of encysted amoebae was noted microscopically and the number was maximal after 72 hours. KOH brought about the same result but not sodium carbonate or phosphate buffer over a wide range. Glycogen was abundant in the amoebae and 1 or 2 nuclei were present as shown by staining. [The poor reproduction of plates which accompany the paper make it impossible to distinguish structural characters.] When kept at 37°C. the cysts degenerated within 48 hours, but when kept in the refrigerator at 4°C. some 4-nucleated cysts were formed in which chromatoid bodies were recognized and the cysts appeared to remain unchanged for 30 to 40 days.

In all, 62 experiments were performed in this way with 3 different strains of *E. histolytica*, and 58 were successful in producing encystation. It was noted that the cysts formed in the test tube were generally larger than those in the faeces from which trophozoites had been cultured. Two types of encystment are described. Excystment of these cysts formed *in vitro* was observed only once in the course of 30 experiments. *J. D. Fulton*

SAITO, M. **On the Influences of Bacterial Flora upon the Excystation and Subsequent Multiplication of *Entamoeba histolytica* in Culture Media.** *Kitasato Arch. Exper. Med.* 1951, Nov., v. 24, No. 2, 239–48. [13 refs.]

The effect of bacteria on the development of *Entamoeba histolytica* in culture was studied by cultivating bacteria-free cysts with a single species of bacteria. The amoebic cysts were concentrated by sugar flotation, after which they were treated with 1 : 3000 dilution of mercury chloride for about 15 minutes, and then washed in sterile distilled water by centrifugation. The sediment containing numerous cysts was placed in broth containing 10,000 units of penicillin and streptomycin for 8–10 hours. Finally, the cysts were again washed in distilled water and inoculated into a semi-solid medium, the slope of which consisted of horse serum and Ringer's solution, while the covering fluid contained equal parts of broth and distilled water, with small amounts of salts. Sterile rice starch was also added to the medium. The bacteria tested were represented by 14 strains of *Bact. coli*, 3 *Bact. alkaligenes*, 2 *Proteus* and 1 *Pseudomonas pyocyanea*, which were all isolated from amoebic cultures. In addition to these, single strains of *Salmonella typhi*, *Shigella*, *Staphylococcus* and *Streptococcus* were used.

The amoebic cysts failed to hatch in the absence of bacteria, but did so on addition of a culture of a single species, *Bact. coli* promoting excystation more effectively than the other species. However, some strains of *E. histolytica* did not excyst or did not grow further after excystation, even in the presence of this bacterium. *C. A. Hoare*

YANAI, T. & OKAMOTO, J. **Relationship between the Number of *Escherichia coli* in Stools and the Infectivity of Rats to *Entamoeba histolytica* in the Experimental Infection of the Amoebae.** *Kitasato Arch. Exper. Med.* 1952, May, v. 25, No. 1, 67–8.

The authors infected rats orally with *E. histolytica* cysts and at the same time counted the number of *Bact. coli* per gm. of the rats' faeces. The counting was done by cultivating 0·1 cc. of stool emulsified in " one hundredfold water or of its serial double dilution ".

The relationship between numbers of *Bact. coli* and infection of the rats by *E. histolytica* is shown in the following table.

Number of *Bact. coli* per gm. of stool (thousands)	Number of rats	Number of rats infected
Under 100	6	2
100–1,000	25	17
1,000–10,000	12	10
Above 10,000	11	11

Infection occurred more readily in those rats having larger numbers of *Bact. coli*. It is assumed that bacterial overgrowth either reduced the resistance of the mucous membrane or promoted excystation and multiplication of the amoebae. *H. J. O'D. Burke-Gaffney*

ISHII, Y. **On the Ulcer Formation in the Caecum at the Site of Experimental Injection of *Entamoeba histolytica*.** *Kitasato Arch. Exper. Med.* 1951, Nov., v. 24, No. 2, 235–8.

This paper deals with the localization of ulcers in rats infected with *Entamoeba histolytica* by intracaecal inoculation of cultures. Of a total of

82 rats used in the experiment, 31 became infected ; in 13 of these there were ulcers in the caecum, which in 8 cases were formed at the site of injection. A detailed description is given both of these ulcers and of those in other parts of the caecum. It would appear that the lesion produced by the needle in the course of inoculation is more readily invaded by the amoebae, and the destruction of tissue at this site is greater than in the other ulcers.

C. A. Hoare

LAARMAN, J. J. Nieuwe methodes voor het concentreren van amoebecystes in de ontlasting. [**New Methods for Concentrating Amoebic Cysts in Faeces**] *Nederl. Tijdschr. v. Geneesk.* 1952, Mar. 22, v. 96 (i), No. 12, 681–4. English summary (9 lines).

This is the Dutch version of the paper written in English [see this *Bulletin*, 1952, v. 49, 953].

KENNEY, M. **Micro-Kolmer Complement Fixation Test for Amebiasis.** *Amer. J. Trop. Med. & Hyg.* 1952, Sept., v. 1, No. 5, 717–26. [11 refs.]

Conflicting results have been obtained by a variety of workers with the various complement-deviation tests hitherto used for the diagnosis of amoebiasis. One of the most disconcerting features has been the frequency of false positive reactions. To reduce these there latterly has been a tendency to dilute the test sera, to reduce the amount of antigen, and to shorten the time allowed for fixation ; as a result the sensitivity of the test has suffered and false negative results have become unduly obtrusive. The key to a reliable complement-deviation test lies in the use of a good antigen, which is both specific and sensitive. This the author has obtained by following in general the method recommended by REES *et al.* [this *Bulletin*, 1943, v. 40, 456] for the preparation of antigen. The Micro-Kolmer technique, which is a modification of the Kolmer-Wassermann technique, was that used in the performance of the actual test. [The details of the preparation of the antigen, of the subsequent setting up of the materials, and the interpretation of the results are set out in detail and should be consulted in the original.]

Known positive and negative controls were included in each batch of tests, and sera from some 120 patients harbouring intestinal parasites other than *Entamoeba histolytica* were also tested. Of 22 patients passing vegetative *E. histolytica* in the stools 20 (90·9 per cent.) gave positive tests ; of 7 passing *E. histolytica* cysts 2 (28·6 per cent.) gave positive tests. Of 98 patients with gastro-intestinal troubles but apparently free from all intestinal parasites 7 (7·1 per cent.), and of 120 similar patients with intestinal parasites other than *E. histolytica* 4 (3·3 per cent.), gave positive tests. Of 56 patients free from gastro-intestinal disorders and with no intestinal parasites only 1 (1·8 per cent.) gave a positive test.

On consideration of the 12 patients giving positive tests, but free from *E. histolytica* infections in so far as failure to find the parasite indicated this to be the case, the author is doubtful if all were in fact false positive reactions. Of the 7 of them suffering from gastro-intestinal disorders 2 gave a history of amoebiasis ; in 2 others of them hepatic amoebiasis was suspected ; and in the 3 other cases there was a clinical diagnosis of amoebic colitis. Five of these patients improved rapidly after surgical intervention and anti-amoebic treatment given in the absence of a parasitic diagnosis.

The author considers that the results of his tests on 303 patients show that the test is useful in disclosing cases of intestinal amoebiasis. Details are shown in 7 tables.

A. R. D. Adams

ELSDON-DEW, R. & MADDISON, Shirley E. **Amoebic Complement-Fixation Reaction.** *J. Trop. Med. & Hyg.* 1952, Sept., v. 55, No. 9, 208–11.

An antigen was prepared from local [Durban] strains of amoebae obtained as free as possible from bacterial contaminants. Individual amoebae were taken from the initial cultures by means of a micro-technique ; those resulting cultures which were free from contaminating organisms were used for the preparation of the antigen. [The details of technique should be sought in the text.] The actual preparation of the antigen and its use broadly followed the method used by FULTON *et al.* [this *Bulletin*, 1951, v. 48, 734].

In a table are set out the results of tests done on nearly 500 patients ; 58 of these were considered to be free from amoebiasis, and 425 of them were suspected to suffer from it. Only 63 per cent. of 363 persons known to be harbouring amoebae were shown to have complement-fixing antibodies in the serum ; of the 58 controls none gave a positive test ; the sera of 28 of 29 patients with amoebic liver abscesses gave positive reactions ; there seemed to be a relationship between the positivity of the test and the duration of the infection and age of the patient. *A. R. D. Adams*

VAN STEENIS, P. B. **Coecum Amoebiasis as a Cause of Constipation and other Clinically Mitigated Forms of Amoebiasis.** *Documenta Med. Geograph. et Trop.* Amsterdam. 1952, Sept., v. 4, No. 3, 241–8.

In the Netherlands, as oppposed to the tropics, amoebiasis often causes only minor symptoms, among them constipation. Various explanations connected with the parasites and their accompanying intestinal flora have been advanced to explain the differences in the disease as it occurs in the two types of climate. The histories of two patients with amoebiasis and chronic constipation are given ; both were considered to suffer from caecal amoebiasis ; suitable treatment of the infection cured the constipation.

A. R. D. Adams

BADÍNEZ S., O. & SIQUÉS E., Griselda. La *Entamoeba histolytica* en las apendicitis operadas en los Servicios de Urgencia de Santiago. [*Entamoeba histolytica* **in Appendices Removed at Emergency Operations in Santiago**] *Bol. Informaciones Parasitarias Chilenas.* 1952, July–Sept., v. 7, No. 3, 36–8. [17 refs.]

The English summary appended to the paper is as follows :—

" The authors study 159 cases of acute appendicitis in non-selected patients operated in emergency services in Santiago.

" In 20·5% of them, they found the presence of *Entamoeba histolytica* in the appendix. They make an histopathologic study of the lesions and discuss the importance of the parasite in the production of these lesions."

MIGUEL HERRERA, J. Meningo-encefalitis por ameba histolítica. [**Meningo-Encephalitis Caused by** *Entamoeba histolytica*] *Archivos Med. Panameños.* 1952, Apr.–May–June, v. 1, No. 2, 149–58, 5 figs. [16 refs.]

NOWICKI, E. L. **Amebic Abscess of the Foot.** [Correspondence.] *J. Amer. Med. Ass.* 1952, Oct. 25, v. 150, No. 8, 813–14.

The author, from Caracas, Venezuela, refers briefly to some records of cutaneous amoebiasis and then records two cases seen by himself which were apparently unrelated to intestinal amoebiasis.

The first patient was a welder who burned his right foot during the course of his work. Despite prophylactic and curative treatment which included penicillin

and sulphonamides, a necrotic lesion occurred which became steadily deeper. Besides streptococci and Gram-negative bacilli, the pus showed actively motile *Entamoeba histolytica*. After treatment with emetine, 0·04 gm. twice daily for 5 days, there was significant improvement. Within a week, the wound was closed with normal granulations. After 5 days interval, the course of emetine was repeated. Recovery was complete and has been maintained for a year.

The second patient had stepped on a rusty nail. When seen some weeks later, his condition was poor and he had toxic symptoms and a blood picture suggesting myeloid leukaemia (possibly due to excessive sulphonamide treatment already given elsewhere). Blood smears revealed the presence of *P. falciparum*. The patient had a deep abscess with fistula on the sole of the right foot : only *E. histolytica* was found in the pus. Because of the patient's condition, anti-amoebic treatment was not recommended. However, he responded in a few days to anti-malaria treatment and at the same time the amount of pus decreased. Within a week the wound was closed without specific anti-amoebic treatment.

A high percentage of the local population pass amoebic cysts, which are found in dust during the dry season. The author considers that while the probability of wound infection by amoebae is high in Venezuela, it occurs rarely because " special tissue conditions " are necessary to permit the growth of amoebae in the wound. In the cases reported, tissue resistance was decreased by (1) the burn, (2) the prolonged fever, with many immature granulocytes in the blood. As in the case of culture media, amoebae do not grow in a wound without associated organisms. The correct treatment is to control the amoebae with emetine and the associated organisms with other specific drugs. It is suggested that in tropical countries, resistance to treatment in the case of infected wounds is an indication for the examination of a fresh drop of pus for amoebae.

[Although it is stated that these infections were " without any relation to intestinal amebiasis ", there is no record of any stool examinations or other specific attempts to exclude that condition. Furthermore, in the second case, the healing and disappearance of the amoebae after anti-malaria treatment alone does not suggest that the amoebae found in the wound were aetiologically significant.] *H. J. O'D. Burke-Gaffney*

Charmot, G., le Henand, F., Mathieu, P., Sylla & Ouedraogo, Y. Premiers résultats du traitement de l'amibiase intestinale aiguë en A. O. F. par le 4482 RP. [**Preliminary Results of the Treatment of Acute Intestinal Amoebiasis with 4482 RP in French West Africa**] *Bull. Méd. de l'Afrique Occidentale Française.* 1952, v. 9, No. 1, 97–101.

4482 R.P. is described as " *l'acide p. sulfamido-o-amino-phénylarsique* ", [presumably " *phénylarsinique* ", see this *Bulletin*, 1952, v. 49, 274] which it is stated has been shown to possess remarkable amoebicidal activity in rats and in man, and to be relatively atoxic. The authors tried three chemical variants of this compound in the treatment of 24 patients suffering from amoebiasis. They state that the immediate results were encouraging, but there were relapses in some of the patients re-examined later. *A. R. D. Adams*

Canet, J. & Ghéstin, F. Premiers essais de traitement de l'amibiase intestinale en Indochine par l'acide *p*.sulfamido-*o*-amino-phénylarsinique. [**First Trials in Indo-China of *p*-Sulphamido-*o*-amino-phenylarsinic Acid in the Treatment of Intestinal Amoebiasis**] *Bull. Soc. Path. Exot.* 1952, v. 45, No. 4, 486–502.

The amoebicidal properties of " l'acide *p*. sulfamido-*o*-amino-phénylarsinique" have been examined by several French workers [this *Bulletin*, 1952, v. 49, 621].

Their reports have been uniformly encouraging. The present authors have treated 30 patients of diverse nationalities, in Indo-China, all of them suffering from acute amoebic dysentery, with the compound. They report their results in detail in this paper. They conclude that the drug produces a very satisfactory immediate response, with disappearance of the parasites from the stools, and that it causes no toxic side effects. There were some relapses.

A. R. D. Adams

ARMSTRONG, T. G., WILMOT, A. J. & ELSDON-DEW, R. **Terramycin in the Treatment of Amoebic Dysentery.** *South African Med. J.* 1952, Sept. 20, v. 26, No. 38, 766–8.

Fifty-one African males suffering from acute amoebic dysentery were treated with terramycin, the dose being 250 mgm. by mouth every 6 hours for 15 days (a total of 15 gm.). " Success " of the treatment means that the patient had become symptom-free, all lesions had vanished on sigmoidoscopic examination, and amoebae had vanished from the stools ; " possible " failure implies absence of symptoms, persistence of visible lesions and absence of amoebae ; " absolute failure " is self-explanatory, and " removal from treatment " is used when there was deterioration during treatment and it was stopped. Under these headings the immediate effects of terramycin treatment and those of control groups given emetine or aureomycin are set out in the following table. [The intervals 10, 20 and 27 days presumably indicate the intervals after completion of treatment, though this is not clearly stated.] :—

	Emetine	Aureomycin	Terramycin
No. of Cases	50	52	49
10 *Days :*			
Success		67·3	87·7
Probable failure		30·8	8·2
Absolute failure		2·0	4·1
Removed from treatment		—	—
20 *Days :*			
Success	50	94·2	89·8
Probable failure	22	3·9	4·1
Absolute failure	28	2·0	2·0
Removed from treatment			4·1
27 *Days :*			
Success		94·2	91·8
Probable failure		3·9	—
Absolute failure		—	—
Removed from treatment		2·0	8·2

Figures are given in percentages.

Two patients developed amoebic hepatitis while being treated with terramycin and were then effectively treated with emetine and chloroquine. The addition of these two to the 49 cases listed in the table brings the total to 51. Adequate follow-up of the patients was only possible in a few cases.

Fifteen Europeans were treated with terramycin and chloroquine (2 gm. of the former and 320 mgm. of the latter daily for 10 days) [it is not clear how this dosage of 320 mgm. was arrived at ; it is not stated whether it is given in terms of the base]. The follow-up here again was very incomplete, but 2 of the 15

patients relapsed within 2 months, and from 4 no parasites were recovered from the stools at 6 months.

The authors consider that the immediate effect of terramycin alone in acute amoebic dysentery is much superior to that of emetine alone, and that terramycin equals aureomycin in this respect. There is, however, a relapse rate after terramycin or aureomycin treatment comparable with that after treatment with any other single drug treatment. These antibiotics should therefore be used in conjunction with a recognized amoebicide to lower the relapse rate. They should be used only in the dysenteric form of the disease, where there is colonic ulceration. *A. R. D. Adams*

EDGERTON, W. H. & BURCKHALTER, J. H. **Amebacidal Agents. II. 5-Acyl- and 5-Alkyl-7-Dialkylaminomethyl-8-Quinolinols.** *J. Amer. Chem. Soc.* 1952, Oct. 20, v. 74, No. 20, 5209–10.

BALAMUTH, W. & LASSLO, A. **Comparative Amoebacidal Activity of some Compounds related to Emetine.** *Proc. Soc. Exper. Biol. & Med.* 1952, Aug.-Sept., v. 80, No. 4, 705–9, 1 fig. [21 refs.]

This investigation deals with the testing *in vitro* of synthetic substances structurally related to emetine against *E. histolytica* grown in presence of *Bact. coli*, in an attempt to correlate amoebicidal activity and chemical constitution. Emetine itself was tested as well as two quaternary derivatives prepared from it, and at the same time 4 substances described as isovaleric acid derivatives, whose formulae are given to indicate their relationship to those of the emetine series. [The reviewer awaits with interest publicaton of the chemical part of the work for clarification on the nomenclature of these substances.] The culture medium was liver-egg-yolk infusion with addition of rice starch [this *Bulletin*, 1947, v. 44, 1066]. The end-point, the concentration of drug at which no viable amoebae were demonstrated directly or by subculture, was determined after 48 hours. Measurements were at the same time made of *p*H, by which the activity of emetine is markedly affected, of oxidation reduction potentials and of the bacterial population. The effect of using petrolatum-sealed cultures was also studied [*ibid.*, 1950, v. 47, 538]. Aureomycin was also tested and appeared to inhibit bacterial growth to such an extent that conditions in the culture tubes were made unsuitable for amoebic growth.

The results of the tests showed that emetine was outstanding in its amoebicidal effects and that it had no effect on the bacterial population. Some points of difference occurred between the present results and those of the original authors when the petrolatum seal was used. The end-point is also known to be affected by the nature of the bacterial flora present. In the series of the drugs studied, activity was increased by raising the *p*H value of the medium within limits. Conversion of emetine to quaternary derivatives reduced amoebicidal activity, and pharmacological studies have indicated that a curare-like action is produced although the toxic effects on the heart were reduced. The isovaleric acid derivatives were found to act directly on the amoebae and two of them showed considerable activity. *J. D. Fulton*

SENECA, H., KANE, J. H. & ROCKENBACH, J. **Protozoicidal Properties of Rimocidin.** *Antibiotics & Chemotherapy.* New York. 1952, Aug., v. 2, No. 8, 435–7.

An antibiotic named rimocidin produced by *Streptomyces rimosus*, which also produces terramycin, contains basic and acidic groups and forms a crystalline sulphate. At a concentration of 30 μ gm. per ml. it is haemolytic for human

and rabbit erythrocytes. It has weak anti-bacterial properties, but is active against most pathogenic fungi. When tested *in vitro* against 3 strains of *E. histolytica*, grown with mixed bacterial flora, it proved lethal to the organism at concentrations of 1 in 16,000 to 1 in 2,000 in a diphasic medium after 24 hours' culture. Its activity differed somewhat from that of terramycin, depending on the strain of organism used. Experiment suggested that its action on amoebae was direct. At a concentration of 1 in 80,000 the substance also proved lethal to *L. donovani*, *L. tropica* and *T. cruzi* in culture within 24 hours, and may be worthy of clinical trial in these infections. *J. D. Fulton*

LEPROSY

VAN DOORMAAL, T. A. J. Een geval van lepra ten plattelande. [**A Case of Leprosy in a Rural Area**] *Nederl. Tijdschr. v. Geneesk.* 1952, Nov. 1, v. 96 (iv), No. 44, 2751–2.

The English summary appended to the paper is as follows :—

" Description of a case of lepromatous lepra in the rural area, whose symptoms developed after a trauma of little importance."

CONVIT, J., GONZÁLES, C. L. & RASSI, E. Estudios sobre lepra en el grupo etnico Aleman de la Colonia Tovar, Venezuela. [**Studies on Leprosy in an Ethnic Group of German Origin in Colonia Tovar, Venezuela**] *Internat. J. Leprosy*. New Orleans. 1952, Apr.–June, v. 20, No. 2, 185–93. English summary.

A description is given of a highly inbred ethnic group living 1,796 metres above sea level in the Venezuelan coastal range, descendents of immigrants from the Black Forest in Germany. In the 1,126 examined, 113 leprosy cases were found, of which 43 were lepromatous, 41 indeterminate, and 29 tuberculoid. Of the whole group, 817 were subjected to the lepromin test, and 700 (85·6 per cent.) gave positive results. On 313 of the 817 lepromin-tested persons the tuberculin test was done, and 107 (34·2 per cent.) were positive. Of the lepromin-negative persons only 8·0 per cent. reacted positively to tuberculin. "A comparative study of the results obtained with the two tests gave a gross index of positiveness to lepromin in 55·3 per cent. of the tuberculin negatives and 92·5 per cent. in the tuberculin positives." These results provide ground for thought concerning a positive relationship between the tuberculin and lepromin reactions, as it is now generally accepted that a tuberculous infection is capable of producing a paraspecific reaction to lepromin. The question is asked whether the reverse cannot also be true, a leprotic infection evoking paraspecific tuberculin reaction. The answer to this would require much further study.

Ernest Muir

COCHRANE, R. G. **Bacteriological Index in Leprosy.** *Leprosy Review*. 1952, July–Oct., v. 23, Nos. 3/4, 135–8.

Since the introduction of sulphone therapy it has become important to have a standard method of assessing the amount of leprosy infection in the body, and by doing repeated bacteriological examinations from time to time to be able to calculate what improvement has taken place. The author recommends taking 16 smears by Wade's slit method, and grading each smear up to

6+ ; by adding the findings for the 16 smears the Bacteriological Index is arrived at. The reason for taking as many as 16 smears was : that technicians were allowed to take smears from all cases, and the margin of error was reduced " to such an extent that our findings could be statistically analysed ". [It may be objected, however, that with a limited staff and large numbers of patients the rate of examination of so many smears would have to be speeded up and accuracy therefore sacrificed, the resulting inaccuracy being multiplied by the number of smears. The choosing of sites for taking smears, if accuracy is aimed at, should surely be done by an expert.] *Ernest Muir*

DEL POZO, E. C. & GONZALEZ OCHOA, A. **Two Cases of Prevention and Treatment of Lepra Reaction.** *J. Investigative Dermat.* 1952, June, v. 18, No. 6, 423–4.

MELSOM, R. S. **A Case of Lepra Reaction treated with Cortropine (ACTH).** *Internat. J. Leprosy.* New Orleans. 1952, Apr.–June, v. 20, No. 2, 195–200, 1 fig.

" A case is recorded of lepra reaction with an apparent favorable response to cortropin. No conclusion can be drawn, but the result is in accord with those reported by Roche and associates in Venezuela, the beneficial effects apparently more lasting." [The spelling of cortropin in the title (cortropine) seems to be wrong.]

OLMOS CASTRO, N. **Sensitization to Lepromin induced Experimentally with BCG.** *Internat. J. Leprosy.* New Orleans. 1952, Apr.–June, v. 20, No. 2, 221–8.

Six guineapigs which were negative to both tuberculin and Mitsuda (lepromin) tests were inoculated with BCG intraperitoneally, 3 of them having integral lepromin added to the BCG. The results obtained showed that the addition of lepromin did not appreciably influence the results, and these results were therefore considered to be due to the BCG alone. The dose of BCG varied from 1·5 mgm. to 4·5 mgm. Lepromin tests were made intradermally on the day of BCG vaccination and then again 4 times at certain intervals. The reaction increased in strength in direct proportion to the dose of the vaccine and the length of the interval between vaccination and the lepromin test. In the two guineapigs that received 4·5 mgm. of BCG the lepromin test done 55 days after vaccination produced infiltrated erythema in 24 hours, becoming nodular by the third day, and ulcerating on the ninth day.

It is concluded that vaccination of healthy, lepromin-negative guineapigs with BCG is capable of creating in them a special biological state which makes them sensitive to the injection of lepromin ; and this is interpreted as a manifestation of the phenomenon of group sensitization, which varies in its clinical manifestations according to the time elapsing between vaccination and lepromin testing.

The author describes three periods after BCG vaccination : the *pre-allergic* during the first week ; that of *hypersensitivity* during the second and third weeks ; and that of *hypersensitivity and resistance* beginning in the third week, when the BCG-vaccinated guineapig has developed an immuno-allergic state which renders it capable of reacting to the presence of the dead Hansen bacillus which had been injected previously, as well as to those injected after this condition has developed. *Ernest Muir*

Levine, M., Chung-Hoon, E. K., Ichiriu, E., Arakaki, J. & Beatty, Marguerite. **Serological Response in Various Types and Stages of Hansen's Disease (Leprosy) to Tuberculin-Sensitized Sheep Red Blood Cells.** *Internat. J. Leprosy.* New Orleans. 1952, Apr.–June, v. 20, No. 2, 201–12, 4 figs.

The haemagglutination technique of Middlebrook and Dubos was used to ascertain whether or not serum from leprosy patients not suffering from tuberculosis contains appreciable quantities of antibodies against tuberculin antigens. Three groups were employed : 321 leprosy patients, 109 tuberculosis patients, and 75 blood donors. Only 4 per cent. of the blood donor group had titres higher than 1 : 8, and only 6·4 per cent. of the tuberculous patients gave titres of 1 : 128, while 29·3 per cent. of the leprosy patients had titres of 1 : 128 or higher and 17·8 per cent. of them ranged from 1 : 256 to 1 : 2048. As only 11 of the 321 leprosy patients were tuberculous at the time, and only 23 others had at some time been, or were suspected of being, tuberculous, the high titres of this group cannot be attributed to simultaneous tuberculous infection, and must be considered incident to a serological response induced by infection with the leprosy bacillus.

The titres were high in the lepromatous type, 21·5 per cent. being in the range of 1 : 256 to 1 : 2048, compared with only 2·1 per cent. of the tuberculoid type. The low-titre group (1 : 8 or less) comprised only 22·2 per cent. of the lepromatous cases compared with 51·7 per cent. of the tuberculoid and 96 per cent. of the blood-donor group. Of the leprosy cases with positive bacteriological findings at the time of taking the sera only 17·7 per cent. showed titres of 1 : 8 or less, compared with 55·4 per cent. of those which were negative ; and 23·2 per cent. of the positive group had titres of 1 : 256 or greater, compared with 6 per cent. of the negative one.

The conclusion is that *Myco. tuberculosis* and *Myco. leprae* stimulate the production of common agglutinins in human sera, and are therefore presumed to possess common antigens. " This serological test provides a laboratory tool which opens up new vistas for the study of this disease of antiquity, whose etiological agent has so long defied cultivation." These findings, coupled with observations that BCG vaccination induces the development of positive Mitsuda lepromin reactivity, and that lepromin positivity is associated with resistance to leprosy, raise the hope that BCG vaccination of exposed children, particularly those of leprosy patients, may exert a protective action against this disease.

The results are shown in 5 tables and 4 figures. *Ernest Muir*

Lima, S. de O. Clínica Tisiológica do Hospital—Colônia Curupaití. Histórico—diagnóstico de tuberculose pulmonar em doente de Hansen—instalações da clínica tisiológica. [**Diagnosis of Pulmonary Tuberculosis in Leprosy Patients**] *Rev. Brasileira Tuberculose.* Rio de Janeiro. 1952, Jan.–Feb., v. 20, No. 139, 29–38.

This article is, mainly, if not entirely, historical. It is well known that some leprosy patients die with the signs and symptoms of tuberculosis and that, together with, concomitant with, the infection by *Myco. leprae* there may be indications of tuberculosis, syphilis, cancer and other diseases. Haemoptysis is not definitely diagnostic because, in leprosy, rhinopharyngitis is common, causing epistaxis and blood in the sputum and also haematemesis from the vomiting of swallowed blood. The presence of acid-fast bacilli in the sputum is no help, but the results of X-ray examination, of inoculation of guineapigs and of cultural experiments, would confirm *Myco. tuberculosis* as would also the benefit derived from antibiotics, especially streptomycin, and from PAS, collapse therapy, pneumothorax and pneumoperitoneum.

As regards the history, the author divides this into three periods : 1. Prior to the sulphonamide era, up to 1948 tuberculous leprosy patients were treated by clinical leprologists ; diagnosis was doubtful, treatment precarious and prophylaxis absent. 2. From 1948 to 1950, when a tuberculosis clinic was set up and diagnosis rested on radiology, bacteriology and clinical condition, and treatment by collapse, by antibiotics and by chemotherapy was taken in hand. 3. From 1951, when a scheme for sanatorium and dispensary treatment was inaugurated and mass X-ray examinations were planned. *H. Harold Scott*

Lima, S. de O. Tratamento da tuberculose em Hansenianos—mortalidade por tuberculose pulmonar em Curupaití—mortalidade, morbidade e profilaxia da tuberculose em doentes de lépra. [**Treatment of Tuberculosis in Leprosy Patients ; Mortality from Pulmonary Tuberculosis in Curupaití ; Mortality, Morbidity and Prophylaxis of Tuberculosis in Leprosy Patients**] *Rev. Brasileira Tuberculose.* Rio de Janeiro. 1952, Mar.–Apr., v. 20, No. 140, 105–18. [10 refs.]

In the first part of this article the author recapitulates the conclusions of his previous paper [see above, 1953, p. 123]. He has found no little difficulty in obtaining reliable data on deaths from tuberculosis in leprosy patients in Brazil ; he quotes Japanese statistics to the effect that 53·3 per cent. of those with leprosy in advanced stages die from tuberculosis and refers to Rogers and Muir's statement that the proportion is high. As regards tuberculosis 119 cases were notified in Curupaití in the 3½ years, 7th May 1948, to 7th November, 1951, and 30 died. In one the death was ascribed to ' leprotic cachexia ', in one to pulmonary embolism, and in one to tetanus from an infected wound. In 1948 there were 47 deaths from all causes in Curupaití, 7 (14·8 per cent.) from tuberculosis ; in 1949, 58 deaths, 6 (10·3) from tuberculosis ; in 1950 and 1951, 29 deaths, 7 from tuberculosis (24·1) in each year ; the increased percentage in the last 2 years is possibly due to improved diagnostic methods. In another table the author subdivides his 119 cases as follows : 49 with minimal lesions, 48 " moderately advanced " and 22 advanced ; 101 with the lepromatous type of leprosy and 18 with the tuberculoid type. These are further split up in the letterpress into percentages of small numbers. Little is gained by record of leprosy patients reacting to the von Pirquet test ; it may be stated, however, that the author found 86·7 per cent. positive among those in their 4th decade ; the Mantoux test would probably have given a higher percentage, nearer to that of Carvalho which he quotes : 94·2 per cent. among those between 20 and 39 years of age in the quinquennium 1942–46. For prophylaxis there must be co-ordination between the National Tuberculosis Service and that of Leprosy, and the setting up of a Tuberculosis Dispensary in one of the centres where there is a leprosy clinic. *H. Harold Scott*

Gómez Orbaneja, J. & García Sanz, J. A. Reticulina en las distintas modalidades de la lepra tuberculoide. Su valor diagnóstico diferencial. [**The Reticulum in the Different Forms of Tuberculoid Leprosy. Its Differential Diagnostic Value**] *Internat. J. Leprosy.* New Orleans. 1952, Apr.–June, v. 20, No. 2, 213–20, 8 figs. on 2 pls. English summary.

The principal object of this study was to devise an additional method of differential diagnosis between the lupus-like form of tuberculoid leprosy and the leprous lesion of sarcoid nature on the one hand, and the lupus of tuberculosis and the sarcoids of Besnier-Boeck-Schaumann on the other. Sections were stained with silver salts and the reticular network was studied. A compact network of fibres is found in the follicles of tuberculoid leprosy lesions. In the

nodular infantile form there are similar fibres but fewer. In reacting tuberculoids the reticulum is almost entirely absent and it is scarce in reacting circinate forms. It is variable in the quiescent forms of the disease. On the other hand in sarcoids there is an incomparably greater amount of reticulum than in tuberculoid leprosy. The lupus-like tuberculoid leprosy lesion may be distinguished from true lupus by the greater development of reticulum in the follicles of the former. The article is illustrated with 8 photomicrographs.

Ernest Muir

COCHRANE, R. G. **The Influence of Recent Advances in Leprosy on Present-Day Conceptions of the Disease in relation to its Diagnosis, Treatment and Prevention.** *Edinburgh Med. J.* 1952, Nov., v. 59, No. 11, 509–16. [16 refs.]

A general discussion and review of the present position by a recognized authority.

GARRETT, A. S. & CORCOS, M. G. **Dapsone Treatment of Leprosy.** *Leprosy Review.* 1952, July–Oct., v. 23, Nos. 3/4, 106–8.

This report [from South East Nigeria] is in continuation of a previous report made last year [this *Bulletin*, 1952, v. 49, 156], and gives a summary of 22 months' experience of treatment of 10,000 patients with leprosy by DDS. In the central settlement about 1,000 were treated, and the rest at 27 out-clinics increasing to 39, where the number of patients treated rose from 5,000 at the end of the first 4 months to over 10,000. The medical staff varied from 1 to 3 doctors, and the qualified nursing staff from 1 to 6. The bulk of the work fell on lay workers trained for the purpose. The dosage by mouth, as mentioned in the previous report, was at first 0·2 gm. daily, for 6 days a week, but this was reduced to a maximum of 0·4 gm. twice a week.

The results in tuberculoid cases were on the whole satisfactory, lesions becoming flattened and regaining colour in 60 per cent. of cases in 18 months, though about 10 to 15 per cent. still show activity. In another large group the macules appeared entirely flattened or wrinkled but the pigment has not returned or has returned only in part. In the lepromatous cases the great majority have improved without incident apart from very mild lepra reactions. There were more serious lepra reactions in 10 per cent., and repeated nerve reactions in another 10 per cent. Out of 1,500 lepromatous cases 15 were changed to thiacetazone treatment because of repeated lepra reactions. Eye reactions were rare and controlled by temporary suspension of the drug, but 5 patients affected had to be changed to thiacetazone. In nearly all cases the bacteriological progress was steady, as is shown in tabular results of cases taken at random.

Under *Drug Intolerance* it is stated that the general health of the patients is much improved, but there was dermatitis in 2 to 3 per cent., often accompanied by enlargement of the liver and with occasional jaundice. In the first 2,000 patients, when the larger doses were being given, 4 died of this condition, and 2 more later. About 10 proved difficult to desensitize, and 4 of them had to be transferred to thiacetazone treatment.

New trophic lesions have been uncommon, and gangrene spreading from trophic ulcers much less common than with chaulmoogra oil treatment, probably as the result of the action of DDS on complicating organisms. [This article is of great value as showing what results can be obtained with mass treatment under primitive conditions and with a very small qualified staff, and the comparative safety and effectiveness with which DDS can be used.]

Ernest Muir

DREISBACH, J. A. **Sulphone Levels in Breast Milk of Mothers on Sulphone Therapy.** *Leprosy Review.* 1952, July–Oct., v. 23, Nos. 3/4, 101–6, 1 graph.

Various methods for preventing the children of leprous parents from contracting leprosy are discussed, such as the removal at birth or later to a crèche or preventorium. Artificial feeding was found unsatisfactory as the mother lost interest in the child, and the expense was great. More satisfactory was the method by which the mother milked her breasts and the milk thus obtained was sterilized and given to the child.

Next was considered the possibility that the child might be safely suckled at the breast provided it was found that in the milk of a mother on sulphone treatment sufficient sulphone was secreted and absorbed by the child to counteract the possible infection acquired from the mother. It was found that at 6 hours after administration of sulphone (5 gm. of sulphetrone injected) the concentration in mgm. per 100 cc. was 9.0 in the mother's blood and 1·4 in the milk. Such milk given to the child produced 4 hours later an average of 2·6 mgm. per cent. in the child's urine. " Although we do not know what the sulphone blood levels were in these infants, we do know that a very definite and measurable amount was excreted in their urine. It is conceivable that these blood levels, even though they were undoubtedly low and much under the optimal therapeutic level, might possibly be of prophylactic value. The actual evaluation of such a possibility is a study that will take years of observation and study fraught by many difficulties, and also possibilities of error."

Ernest Muir

PAUL, H. **Result of Analysis of Sulphone Negative Cases over a Period of 4–6 Years.** *Leprosy Review.* 1952, July–Oct., v. 23, Nos. 3/4, 115–21. [11 refs.]

Details are given of cases at Chingleput in S. India which have become bacteriologically negative during the last 4 to 6 years on DDS and its derivatives administered in oily and aqueous suspensions or solutions, also diasone by mouth. Over a period of 4 years 206 cases were treated and 79 became negative. The author says, " We have learned to our cost, though no patients died, that massive dosage serves no more useful purpose than the very minimal average dose, which eliminates as far as possible the provocation of toxic symptoms . . . it is not the quantity of the drug that appears to be of importance, but the duration of regular treatment that is essential if satisfactory results are to be obtained. It appears that it will take not less than $2\frac{1}{2}$ to 4 years for moderate lepromatous cases to become negative in any appreciable numbers. Further it will be seen that the different forms of sulphones have produced almost the same negative rate in about the same period of time. It is, however, my opinion that any sulphone in oil dispersion is superior to the soluble and oral sulphones. Again, from the economic point of view, the basic sulphone in whatever form it is used is the cheapest."

Ernest Muir

LOWE, J. **Acute Agranulocytosis caused by TB1/698 (Para-Acetamidobenzaldehyde Thiosemicarbazone).** *Leprosy Review.* 1952, July–Oct., v. 23, Nos. 3/4, 109–14.

Agranulocytosis was diagnosed in 4 cases out of 146 under treatment with TB1/698 for leprosy. All of them were within the first few weeks of treatment. The condition was severe in three of them and slight in one. The 3 severe cases were treated with large doses of penicillin, the TB1 being stopped. All

of them recovered. It is concluded that treatment with TB1 can be used with safety only where adequate facilities for the detection and treatment of agranulocytosis are available. *Ernest Muir*

Lowe, J. **Isoniazid in Leprosy.** *Lancet.* 1952, Nov. 22, 1012–13.

Isoniazid, because of its value in tuberculosis, was tried out in 27 leprosy patients for periods of 14 to 23 weeks, the patients being chosen as particularly suitable for showing the results of chemotherapy. While it may be of slight benefit in leprosy its action is much less than that of sulphones or thiosemicarbazone. The results in 7 patients, whose treatment with other drugs had produced acute or subacute complications, were no better than those obtained simply by stopping treatment. *Ernest Muir*

Bland, R. H. **Leprosy Control in Nigeria.** *Internat. J. Leprosy.* New Orleans. 1952, Apr.–June, v. 20, No. 2, 175–84.

Nigeria has an area of about 700 miles square and a population of approximately 25 millions. There are 55,882 cases of leprosy under treatment at 47 main centres and many subsidiary ones, and of these patients 27,743 are segregated. The control policy aims at segregation of all proved infective patients. As it is impossible to provide for all such cases in properly equipped leprosaria, provision is made of village segregation combined with treatment clinics. "As a result of propaganda and example, each local community is persuaded to provide, at its own expense, its own leprosy segregation village. The infective patients of that community thus can live under conditions of segregation in which they are able to maintain themselves on land provided by the community or even on their own hereditary land." These villages are supervised from the central leprosarium, to which patients needing special care can be temporarily admitted.

All the leprosy work throughout the country is co-ordinated by a Leprosy Board. It is proposed to have in every province at least one central leprosarium for not more than 1,000 patients which will give priority of admission to infective patients and children. Based on these will be a network of rural control services with segregation villages. Out-patient clinics, in the absence of facilities for segregation of proved infectious cases, will be actively discouraged.

Ernest Muir

Wheate, H. W. **Some Principles and Suggested Methods of Leprosy Control in Eastern Uganda.** *Leprosy Review.* 1952, July–Oct., v. 23, Nos. 3/4, 122–7.

The author is the Medical Superintendent of the Kumi and Ongino leprosy sanatoria, which serve the eastern half of Uganda. A plan is described which aims at the ultimate control of leprosy in that area. The conditions in Uganda are compared with those in Nigeria : there is no ostracism of the leprosy patient as there is in Nigeria, the people are less capable of taking responsibility, European-led trained staff is more essential, and the communities are not organized in villages but live in scattered homesteads, so that the Segregation Village used in Nigeria is not practicable.

The scheme proposed comprises 3 methods. (1) A mass treatment and preventive service within a radius of 20 to 30 miles of the leprosy institution, with 5 dispensaries visited weekly by a European and a team of African dressers. (2) The Rural Preventive Unit to cater for a tribal area remote from the existing leprosy institution, staffed by a European and a number of African dressers,

etc. It again would consist of a central unit, and 5 dispensaries visited once a week by the European and a travelling team. (3) A " Satellite Settlement " to be established in a Nilotic tribal district 200 miles from Kumi where the tribe has recently passed Local Government legislation requiring the house isolation of every case of leprosy certified by a Medical Officer as being infectious. This Settlement would provide additional treatment facilities, and would be under the direct control of the District Medical Officer. " It should be emphasised that such a scheme is possible only because of the great public demand for leprosy treatment centres nearer than 200 miles away."

In the first two methods it is proposed to use DDS tablets giving 600 mgm. once a week as the maximum dose. In the third, as there will be less European supervision, it is proposed to use injections of aqueous sulphetrone.

Ernest Muir

HELMINTHIASIS

Lobo, M. B., Moreira, M. & de Oliveira, J. E. Resultado do exame parasitológico (helmintos e protozoários) de 10,019 amostras de fezes pela técnica de Faust. [**Results of the Faust's Concentration Method on 10,019 Specimens of Faeces**] *Hospital.* Rio de Janeiro. 1952, Aug., v. 42, No. 2, 145–52. [16 refs.] English summary.

The authors examined by Faust's method specimens of faeces from 10,019 persons covered by the insurance plan for civil servants in the Federal Districts of Brazil. The results are shown in 5 tables, in terms of numbers and percentages according to total findings, species, and number of species per specimen in respect of helminths and protozoa, together and separately.

Altogether, there were 69·7 positive results (helminths, 46·3 per cent., protozoa 44·1). The helminths found most frequently were *Trichuris* (29·7 per cent.), *Ascaris* (17·1) and hookworms (10 per cent.). The figures for protozoa were *E. coli* (18·4 per cent.), *E. nana* (15·6), *Giardia* (9·8) and *E. histolytica* (6·2 per cent.).

It is emphasized that the findings are relative, as some civil servants were examined at other laboratories, many had been referred by clinicians and, in a few cases, the examinations listed were from the same person.

The high indices found make it desirable to extend this investigation.

H. J. O'D. Burke-Gaffney

Woodruff, A. W. **Intestinal Worms.** *Brit. Med. J.* 1952, Nov. 1, 988–91.

A general discussion and review.

Abou-el-Naga, I. & Saleh, A. **Blood Eosinophilia in Parasitic Infections Endemic in Egypt.** *J. Roy. Egyptian Med. Ass.* 1952, v. 35, No. 8, 526–32.

Alves, W. D. & Gelfand, M. **Treatment of Schistosomiasis with Sodium Antimony tri-Gluconate by Mouth.** *Trans. Roy. Soc. Trop. Med. & Hyg.* 1952, Sept., v. 46, No. 5, 543–6.

Antimony, in the form of tablets of trivalent sodium antimony tri-gluconate, was given orally to 23 patients in Southern Rhodesia known to be infected with *Schistosoma haematobium* or *S. mansoni* or both. The patients were male Africans between the ages of 15 and 55 years, and all were in hospital during the treatment and for at least a month thereafter. The dose used initially

was 3 grains a day for 12 to 14 days, but as this caused no toxic side-effects it was increased to 5 grains a day and later to 7 grains a day, all being given in divided doses, in subsequent cases. Later an enteric-coated batch of tablets was used to see if the coating affected the results. There was no difference in effect between the plain and the enteric-coated tablets. Ten patients were in the 3-grain dosage group ; 6 in the 5-grain ; and 7 in the 7-grain dosage group. The relevant details of each case are set out. From a consideration of them the authors found the results of the treatment to be most disappointing. One patient with an *S. haematobium* infection ceased to pass eggs over a 3-months observation period ; one with a double infection ceased to pass *S. haematobium* eggs but continued to pass *S. mansoni* eggs ; and the remaining 21 patients' infections remained uncured. *A. R. D. Adams*

Ishii, N. & Tsuda, E. **Possibility on the Spreading of *Onchomelania nosophora*, the Intermediate Snail Host of *Schistosoma japonicum*, in other Areas besides its own Habitats.** *Yokohama Med. Bull.* 1951, Dec., v. 2, No. 6, 366–75, 1 fig.

The authors state that the habitats of *Oncomelania nosophora* in Japan are confined to the Yamanashi, Shizuoka, Tone-River, Katayama and Chikugo-River areas. In order to test the possibility of this snail vector of *S. japonicum* spreading to other areas, samples of soil from previously uninvaded regions in Tokyo, Mizonokuchi and Sakadomachi were employed for breeding snails collected in the Yamanashi area. The authors describe the results obtained from these experiments, which indicated that the snails might thrive in these previously uninvaded areas. They are careful to point out, however, that this evidence must not be regarded as conclusive since " it is true that the factors of climatic and other conditions would have some influences upon the breeding of snails ". The findings are shown in great detail in 10 tables and a graph. *R. M. Gordon*

Hunter, G. W., Freytag, R. E., Ritchie, L. S., Pan, C., Yokogawa, M. & Potts, D. E. **Studies on Schistosomiasis. VI. Control of the Snail Host of Schistosomiasis in Japan with Sodium Pentachlorophenate (Santobrite).** *Amer. J. Trop. Med. & Hyg.* 1952, Sept., v. 1, No. 5, 831–47, 8 figs. [23 refs.]

This paper describes the progress of experiments designed to formulate plans for the control of *Oncomelania nosophora*, the amphibious vector of *Schistosoma japonicum*. The original plan of the experiments was divided into four stages : (1) laboratory screening of potential molluscicides ; (2) testing in the field, on a small scale, of the more promising chemicals ; (3) testing in the field, over a large area and for a prolonged period, of the most satisfactory molluscicide, and (4) an attempt to control the snail in one of the 5 known endemic areas of schistosomiasis in Japan. The first two stages of the programme have been completed and have established the value, both in the laboratory and under field conditions, of sodium pentachlorophenate (Santobrite) as a molluscicide [see this *Bulletin*, 1952, v. 49, 415, 416]. The third stage of the programme was begun in 1950 [Hunter *et al. J. Parasitol.*, 1951, v. 37 ; (suppl.) : 31–32 (abstract)], and its progress and completion during 1950 and 1951 are described in the present paper.

The area selected for the experiment was on the island of Kyushu and supports a population of 1,050 persons, 73 per cent. of whom were suffering from schistosomiasis. " It was decided to apply the chemical biannually, in the spring and the fall. After consultation with statisticians, a total of

170 quadrats were selected at random and marked by stakes. All snails were collected from each quadrat, counted, and the total number of living snails determined. Upon completion of these pretreatment counts the molluscacide was applied and two weeks later post-treatment counts of living snails were made in adjacent quadrats." Snails from similar but untreated areas were also collected and counted and acted as controls.

The molluscicide employed was sodium pentachlorophenate dissolved in water to form a solution of approximately 1 : 200, and this was applied at the rate of about 390 mgm. per square foot. At this concentration the molluscicide was not pathogenic to man or domestic stock, and although it killed many of the dicotyledonous plants, it had little effect upon the monocotyledons and was non-injurious to wheat and rice. It was applied to ditches and their banks, the edges of rice fields, with attention to culverts, overhanging banks, and rodent burrows.

The results of the experiments are summarized as follows :—

" The feasibility of molluscacidal control of the amphibious snail, *O. nosophora*, by repeated applications of sodium pentachlorophenate (Santobrite) to 12 miles of ditch comprising the entire irrigation system of the 150 acre area of Nagatoishi has been demonstrated. This chemical was applied during both spring and fall of 1950 and 1951. The initial application reduced the snails to the extent of 98·1 per cent. The residual population apparently had a high reproduction potential as repopulation was considerable at the end of the first summer. The fall application in 1950 was apparently less effective than the initial spring kill ; however, there appeared to be a residual effect which augmented the results secured in the fall.

" In the spring of 1951 the pretreatment snail count was low and some repopulation occurred during the summer, but to a considerably less degree than during 1950. The fourth application gave an improved fall kill reducing the population by 99 per cent."

In view of these satisfactory results the authors believe that by using sodium pentachlorophenate as a molluscicidal agent the virtual eradication of schistosomiasis from Japan can be achieved at a reasonable cost with a 5 to 7 year programme for each of the 5 endemic areas.

It is clear that the authors do not intend the term " reasonable cost " to be misconstrued into meaning " small cost ", but that it is founded on the estimate that " successful eradication of schistosomiasis would result in an eventual saving (by elimination of treatment and in wages saved) of a sum of almost $3,000,000 per year in this area alone ". The estimated saving of 3 million dollars per year is, in its turn, founded on the following data furnished by officials of the prefectures of Fukuoka and Saga.

a. Estimated number of cases	28,617
b. Man-hours lost per year	24,213,120
c. Estimated cost of current treatment of infected persons per year	$177,938*
d. Wages lost per year	$2,522,200

*Based upon the Japanese yen valued at the current rate of exchange Y360=$1.00.

[It would be of interest to know how the above figures were arrived at. During a recent visit to the cotton-growing area of the Anglo-Egyptian Sudan, where *S. mansoni* and *S. haematobium* infections are prevalent in the labour force, Professor T. H. Davey and the reviewer made strenuous but unavailing efforts to obtain reliable evidence from the local authorities for or against any marked loss of man-power being attributable to infection with one or both of these parasites.] *R. M. Gordon*

KAGAN, I. G. **Acquired Immunity in Mice infected with** *Schistosomatium douthitti*. *J. Infect. Dis.* 1952, Sept.-Oct., v. 91, No. 2, 147–58, 5 figs. [19 refs.]

"Immunity to superinfection was acquired by mice (CFI, Carworth Farms strain) against *Schistosomatium douthitti* 35 to 127 days (end of test period) after an initial infection as ascertained by the recovery of schistosomes 16 to 25 days after a challenging superinfection of 50 cercariae (a mixture of both sexes). Resistance in mice is increased by a repeated immunization with a series of exposures at 5– or 6-day intervals for several weeks. Both male and female worms developing from the challenging infection are reduced in number and stunted in growth as compared to worms in control mice.

"An initial infection of female worms produced an acquired immunity to superinfection when tested after 60 to 121 days (end of test period) by a superinfection with male, female, or male and female worms as indicated by their reduced number but not by a retardation of their development.

"An initial infection of male worms in all but one experiment did not induce resistance to superinfection, as indicated by no reduction in number in the challenging infection. Male worms in the challenging infection, however, were stunted but females developed normally.

"Quantitative techniques were used in challenging mice and all experiments were individually controlled."

MIYAKE, H. & OIKE, K. [**The Mass Chest Survey of the Lung-Distomiasis (Part 1)**] *Shikoku Acta Med.* 1951, Oct., v. 2, No. 5, 10–15, 1 map & 6 figs. [In Japanese.] English summary.

In July, 1950, many cases of *Paragonimus* infection were found in districts of the Kochi prefecture, Japan. The distribution is shown in a map and a table gives examples of two villages, of 1,709 and 340 inhabitants, where 849 and 159 sputa, respectively, were examined. Ova were found in 69 and 15 cases (8·1 and 9·6 per cent.) representing 4·1 and 4·4 of the population. The authors therefore planned chest X-ray surveys: the X-ray diagnosis of pulmonary distomiasis is not described in text books of roentgenology, and their object was to obtain information on this point.

Owing to primitive conditions, ordinary X-ray apparatus could not be used, so the authors employed a portable condenser-discharge type (which is shown in 4 photographs). With this they were able to take many skiagrams in November, 1950, despite bad electrical power conditions.

The apparatus has 10 condensers, each with a capacity of 5 μF, voltage 8kv. There is a regulator, an X-ray tube (6kw) and its stand. The highest voltage is 80kv and the electrostatic capacity 0·5 μF.

By charging all condensers in parallel for a few minutes, skiagrams could be made "discharging them in series at a moment (ca 1/100 sec.)".

In 73 patients with proved *Paragonimus* infection, radiographic changes such as infiltration, nodules and cystic shadows were seen in 66. Examples are shown in 4 skiagrams, but these are not very well reproduced.

H. J. O'D. Burke-Gaffney

LI, S. Y. **On a New Host, Black Rat, of** *Fasciola hepatica*. [Research Notes.] *J. Parasitology*. 1952, Feb., v. 38, No. 1, 88.

ALICATA, J. E. **Autochthonous Infections of Cattle in Hawaii with** *Fasciola hepatica* **Linn.** [Research Notes.] *J. Parasitology*. 1952, Oct., v. 38, No. 5, 495–6, 1 fig.

Güemes R., Marta. Primer caso comprobado en Chile de Teniasis por *Hymenolepis diminuta.* [**First Cases of *Hymenolepis diminuta* Infection Reported in Chile**] *Bol. Informaciones Parasitarias Chilenas.* 1952, July–Sept., v. 7, No. 3, 44.

Voge, Marietta. **Variability of *Hymenolepis diminuta* in the Laboratory Rat and in the Ground Squirrel *Citellus leucurus*.** *J. Parasitology.* 1952, Oct., v. 38, No. 5, 454–6.

" Experimental introduction of *Hymenolepis diminuta* from the Norway rat into the ground squirrel *Citellus leucurus* is reported.

" Variability and incidence in testis position and number, types of abnormalities and other characters of *H. diminuta* are discussed and compared in controls and experimental specimens.

" The experimental specimens did not differ in any observable way from the controls.

" The characteristics of both groups of specimens were similar to those of *H. diminuta* from other localities and hosts.

" *H. diminuta* in *Citellus leucurus* did not adopt the characters which differentiate *H. citelli* from *H. diminuta.*"

Heilig, R. **Studies on Hookworm Infection.** *J. Indian Med. Ass.* 1952, May, v. 21, No. 8, 356–62. [16 refs.]

Ankylostomiasis is a disease of great importance in India, but, the author complains, no assessment of the extent of hookworm infection in India has been made hitherto ; this is largely owing to failure of diagnosis. He quotes Maplestone and Mukerji (*Health Bulletin*, No. 1, 1939, Delhi) as having stated [prophetically one must assume] that " Rajasthan has little infection ". However, in Jaipur hookworm disease was the main diagnosis in 6·15 and 5·7 per cent. of the cases admitted to the medical wards during 1949 and 1950. The diagnosis must be confirmed by the finding of ova in the faeces ; this may necessitate a persistent search and the use of flotation methods. The author describes the clinial pictures which include a tongue that appeared as if it " had been drenched [drained] of every drop of blood, so ghastly white or grayish-white does it appear " ; the blood picture in the case he quotes shows 2 gm. per cent. of haemoglobin with hypochromia and microcytosis. The heart condition is that already described by the author [this *Bulletin*, 1943, v. 40, 68].

With reference to the possible " hookworm toxin ", the author quotes his experimental work with Visveswar, [*ibid.*, 1944, v. 41, 499] which suggested the existence of such a toxin.

For the treatment of the disease he [rightly] emphasizes the need to bring the haemoglobin up to a reasonable figure, a minimum of 30 per cent. (Sahli), before giving 3 ml. of tetrachlorethylene shaken up in 2 ounces of sodium sulphate, or as Tetracap in gelatin capsules. For the anaemia he uses ferrous sulphate 18–27 grains daily, or, if necessary, saccharated iron oxide intravenously.

[The author gives no estimates of the worm loads of his patients, either based on egg counts or on worms passed after treatment, nor does he mention which is the predominating worm, *Ancylostoma duodenale* or *Necator americanus*. One must assume that as a general rule the loads were light since eggs were difficult to find ; this implies egg counts of less than 200 per gm. of dry faeces, a load usually considered negligible in the areas in India where hookworm is hyperendemic. He does not attempt to explain, or even face, the problem of why in the drier areas in Northern India so severe a clinical picture is associated

with such a very light load of hookworms. This problem is not a new one, but has never been explained. The fact (not mentioned here) that the worms are usually *Ancylostoma duodenale* in Northern India whereas they are predominantly *Necator americanus* in the South and East, is an insufficient explanation.

Is this extremely severe anaemia, which is completely or almost completely curable by haematinics alone, really due to the hookworm infection ?]

L. E. Napier

Rodriguez-Molina, R. **Strongyloidiasis. Report of 100 Cases.** *Bol. Asoc. Méd. de Puerto Rico.* 1952, June, v. 44, No. 6, 234–9.

After a brief account of the life-cycle, pathology, symptoms, diagnosis, prognosis and treatment of infection with *Strongyloides stercoralis* [which is mis-spelt throughout the paper as *S. stercolaris*] the author gives an account of 100 unselected cases from a group of 241 patients (all males, aged 24–78 years) whose stools were positive for *S. stercoralis* infection. The 241 patients represented 4 per cent. of all admissions to a hospital at Porto Rico during 1949 and 1950. The object of this study was to assess the symptomatology and treatment of the infection, so it was decided to exclude all those having organic and functional disease of the intestinal tract and all showing infection with other intestinal parasites. This done, only 32 of the original 100 cases remained. Only 14 of the 32 had symptoms referable to the digestive tract and these were usually mild. In three of these 14 who were treated with gentian violet the symptoms subsided but no report was made on whether the subsequent stool examination was positive or negative. Administration of gentian violet caused toxic effects, abdominal pain, diarrhoea, vomiting and nausea, in 5 out of 19 patients who were treated. A case of concurrent *Strongyloides* and hookworm infection is described : symptoms of intermittent diarrhoea of 4 years' duration were improved by gentian violet treatment, which was followed by the disappearance of signs of *Strongyloides* infection in the stools. Previously, the hookworm infection had been treated, without effect.

The frequency of symptoms in the 14 cases of *Strongyloides* infection alone, was as follows : epigastric pain (4) ; generalized abdominal pain (3) ; epigastric fullness after meals (3) ; nausea and vomiting (3) ; flatulence (3) ; constipation (3) ; anorexia (2) ; diarrhoea (2) ; weakness (2) ; weight loss (1). Single and multiple parasitic infections in the 100 *Strongyloides* cases studied were referable to the following : hookworm, *Trichuris trichiura, Schistosoma mansoni, Trichomonas hominis, Ascaris lumbricoides* and *Giardia intestinalis.*

J. J. C. Buckley

Neghme R., A. & Silva C., R. Trichostrongylidae en Chile. [**Trichostrongylus Infection in Chile**] *Bol. Informaciones Parasitarias Chilenas.* 1952, July-Sept., v. 7, No. 3, 39–40.

The English summary appended to the paper is as follows :—

" The authors report the finding of 37 cases of *Trichostrongylus* infection during entoparasitic surveys in Chile.

" 34 of these cases belong to inhabitants of two provinces (Cautín and Valdivia), located between the 39° and 40° of South latitude."

Jaswant Singh, Raghavan, N. G. S., Misra, B. G., Krishnaswamy, A. K. & Radhagovinda Roy. **A Note on the Ascaricidal Value of Hetrazan.** *Indian Med. Gaz.* 1952, Aug., v. 87, No. 8, 353–6.

The authors studied the effect of hetrazan on adults and children in India infected with *Wuchereria bancrofti* and *Ascaris lumbricoides.* They treated

a group of 702 adults and 291 children under ten years old, the youngest being 2 years old. For ascariasis the dose of hetrazan given was 2 mgm. per kgm. body weight, given twice a day for 5 days. A table shows the number of patients who passed living ascarid worms during the 5 days of treatment and on the sixth day. Of the 993 patients 23·6 per cent. passed 2 to 30 worms. Seven days after treatment 66·6 per cent. of 159 of the patients were still passing eggs of *Ascaris* and 6 to 7 months after treatment 63·3 per cent. of 79 patients were still passing these eggs. The worms had, however, been apparently removed entirely from at least a third of the 993 patients.

Microfilariae of *W. bancrofti* were present in the blood of 13·6 per cent. of the 234 patients who passed living ascarid worms and in 15·5 per cent. of the 759 patients who did not pass worms. It is shown that concomitant ascariasis did not interfere with the effect of hetrazan on the microfilariae.

The authors tried the sweet elixir of hetrazan issued by Messrs. Lederle Laboratories for the treatment of ascariasis of 13 children, and found that it produced a " percentage reduction " of ascarid eggs of 95·3 per cent. when 5 mgm. per kgm. body weight were given twice a day, and of 98·1 per cent. when this dose was given thrice a day. A single dose of santonin produced a percentage reduction of 98·4 per cent. The elixir thus compared well with santonin and had the advantage that it was readily taken and that dieting and post-treatment purging were not needed. The authors refer to the work of others who commend hetrazan as an ascaricide and suggest that COLBOURNE [this *Bulletin*, 1950, v. 47, 768], who obtained better results with oil of chenopodium given to human patients in the Gold Coast, used too small a dose of hetrazan.

[See also HOEKENGA, this *Bulletin*, 1952, v. 49, 1139.] *G. Lapage*

HOPKINS, C. A. **Notes on the Biology of certain *Culicoides* studied in the British Cameroons, West Africa, together with Observations on their possible Rôle as Vectors of *Acanthocheilonema perstans*.** *Ann. Trop. Med. & Parasit.* 1952, Sept., v. 46, No. 2, 165–72, 2 figs. on pl. [13 refs.]

An account is given of a survey of the feeding and breeding habits of medically important *Culicoides* in a number of areas in the British Cameroons. The sites were mostly in villages in and around Kumba, but collections were also made in forest, river banks, and at altitudes up to 4,500 feet. By collecting adults on human bait, it was found that the species biting man were *C. grahami* (day-biting), and *C. austeni* (night-biting). On some of the collecting sites, particularly away from human habitation, *C. inornatipennis* was the commoner day-biting species, and at Tiko, on the Mungo River, an unidentified night-biting species was captured. Apart from these 4 species, only single specimens of other *Culicoides* species were found biting man.

Larval stages were collected by washing samples of the surface soil and debris through a 100-mesh sieve. The larvae of *C. grahami* and *C. austeni* could not be found in this habitat, which was that recorded by earlier authors working in the Gold Coast [this *Bulletin*, 1921, v. 18, 199], and were eventually discovered in the rotting tissues of banana stumps in an early stage of decomposition. The breeding habits of these two species are thus closely linked with human farming activity, and a truly " wild " breeding site was not found during the course of the survey.

Three out of 70 *C. austeni* yielded filarial larvae on dissection, but none was found in 1,500 *C. grahami*. The significance of these results in the epidemiology of *Acanthocheilonema* [*Dipetalonema*] *perstans* is briefly discussed.

The breeding sites are briefly described of 9 species of *Culicoides* which do not bite man. *A. J. P. Goodchild*

MORLEY, J. S. **The Chemotherapy of Filariasis. Part I. Monoacyl Derivatives of 1 : 2 : 3 : 4-Tetrahydroquinoxaline.** *J. Chem. Soc.* 1952, Oct., 4002–8.

MORLEY, J. S. **The Chemotherapy of Filariasis. Part II. Monoacyl Derivatives of 5 : 10-Dihydro- and** *trans*-**1 : 2 : 3 : 4 : 5 : 10 : 11 : 12-Octahydrophenazine.** *J. Chem. Soc.* 1952, Oct., 4008–14.

BRUMPT, L. C. Le mode d'action de la diéthylcarbamazine sur les filaires. [**The Mode of Action of Diethylcarbamazine on Filariae**] *C. R. Soc. Biol.* 1952, Feb., v. 146, Nos. 3/4, 209–11.

After referring to reports that dead adult worms of *Loa* have been found under the skin after treatment with hetrazan (diethylcarbamazine) [this *Bulletin*, 1949, v. 46, 275 ; 1950, v. 47, 262, 1115] the author states that his own experience has been different. One of his patients extirpated a living female worm [apparently *Loa*] on the 9th day of treatment. In another case a worm, which was localized under the conjunctiva, was excised on the 5th day of treatment and remained alive 30 hours in normal saline. In a third case, the author excised a living female filaria on the 5th day of treatment and a living male and a living female on the 20th day ; 10 days still later yet another living male worm was removed. Clearly the usual course of hetrazan treatment does not kill all the adult worms of *Loa*. *F. Hawking*

VARGAS, L. Nota sobre la biología de la microfilaria *Onchocerca volvulus*. [**On the Biology of Embryos of** *Onchocerca volvulus*] *Medicina.* Mexico. 1952, Aug. 25, v. 32, No. 658, 396–7.

The author has tried in several ways to preserve alive in his laboratory embryos of *Onchocerca volvulus*. He obtains the microfilariae by scarification of the skin after sterilization by sulphuric ether, by Thiersch graft or by puncture of a nodule, and places them in a hollow slide in a Petri dish. He has tried many media for cultivation or survival and growth, including those used for bacteria—nutrient broth, nutrient gelatin, lactose broth, haemoglobin, sugar media among others, aerobically and anaerobically at 22° and at 34°C.—but the microfilariae lose motility within 24 hours ; he also tried teased fragments of the thoracic muscles of *Musca domestica*, and amino-acids. In doubly distilled water movement ceases in 30 minutes and in less time still if hypertonic solutions (10, 15 or 20 per cent.) of glucose are added, but motion is regained if dextrose (5 per cent.) human serum is added and when kept at 4°C. they survive for as long as 6 days. In short, the survival depends on two factors, the osmotic pressure and low temperature. This work appears to be preliminary to attempts at determining the factors governing the development of *Onchocerca volvulus* embryos in Simuliidae. *H. Harold Scott*

NETTEL F., R. Oncocercosis. Revisión del problema entomológico de la oncocercosis y plan para la erradicación de *Simulium ochraceum* Walker. I & II. [**Onchocerciasis. Review of its Entomology and Plan for Eradication of** *Simulium ochraceum*] *Medicina.* Mexico. 1952, Sept. 10, v. 32, No. 659, 414–22, 5 maps.

Except for those interested in oro-hydrography relative to helminthiasis this article, though full of detail, will make little appeal and that mainly of local import. Onchocerciasis is a fairly widespread disease and is known to be endemic in much of Africa, in Mexico, Guatemala, Salvador and Venezuela and probably in other districts not yet studied. This is not to be wondered at

when we remember that every patient is a focus, his skin swarming with microfilariae, and that the local streams constitute breading places for Simuliidae in their millions.

A campaign to deal with the problem comprises extirpation of nodules, the source of infection of insects—the number of those blind from ocular onchocerciasis is, says the author, unbelievable—the use of drugs in treatment and eradication of the transmitting insects, notably *Simulium ochraceum*, though many other species are involved, such as *S. metallicum*, *S. callidum*, and those, such as *S. virgatum*, which prefer animal blood to human.

The present article has a historical section on the entomological researches into onchocerciasis and more than 70 names are mentioned [but there is no bibliography of references] and the rest is an account of the oro-hydrography of two States, Chiapas and Oaxaca, with maps [but on so small a scale as to be hardly legible even with a lens]. Of the former 42 rivers are named and of the river Papaloapan in Oaxaca State a still larger number of tributaries, but the endemic focus in this State is much more localized and only about one-sixth the size of that in Chiapas, but a sanitary campaign is more difficult there because the terrain is rough and hilly and means of communication and transport are far from easy. . . *H. Harold Scott*

WANSON, M. Contribution à l'étude de l'Onchocercose africaine humaine. (Problèmes de prophylaxie à Léopoldville.) [**Onchocerciasis in Africans and Problems of Control in Leopoldville**] *Ann. Soc. Belge de Méd. Trop.* 1950, Oct. 31, v. 30, No. 4, 667–863, 65 figs. on 60 pls., 2 graphs (1 folding) & 1 map. [177 refs.]

This issue is devoted largely to a monograph on human onchocerciasis in Central Africa, based on investigations carried out in the Belgian Congo by the workers at Leopoldville, particularly by WANSON, BRODEN, RODHAIN and VAN HOOF, for the 8 years preceding 1950. All aspects of the problems are discussed in detail ; the recent advances in the knowledge of the taxonomy and of the bionomics of the vectors, the application of this knowledge to control and the results, the epidemiology of the disease, the pathogenicity of *Onchocerca volvulus*, the prophylaxis and treatment are all considered at length, and the results of much experimental work and of the field surveys are given. Some of the opinions expressed might be regarded as controversial by some with experience in particular fields, but this is perhaps to be expected in such circumstances.

It is hardly possible to abstract such a monograph, and it should be read in the original by those who are concerned with any of the aspects of onchocerciasis. The more important principles may be summarized as follows :—

Entomological aspects

The taxonomy and distribution of the species of *Simulium* in the Congo are described in detail. Some 40 species were found with a general distribution, but 11 other species, most of them not previously described, were found in certain localities. Those feeding on man in the Congo are *Simulium damnosum*, *S. neavei*, *S. medusaeformis*, *S. albivirgulatum*, *S. nigritarsis*, *S. faini*, *S. bovis*, *S. kauntzeum* and *S. renauxi* ; of these, the first two alone were considered to be vectors of onchocerciasis to man, though it appeared on first consideration that *S. renauxi* might also be an effective vector. [See this *Bulletin*, 1951, v. 48, 825, 826, for later works which indicate that *S. renauxi* is a vector, but may be a race of *S. neavei*.] There is evidence that there are distinct biological races of these species. For example, a race of *S. damnosum*, which did not bite man, was found breeding in certain small streams near Leopoldville.

At Leopoldville, 10 species and 3 varieties were found. The bionomics of *S. damnosum* at Leopoldville are discussed in great detail with the following conclusions :—

(1) the general river courses, although apparently favourable sites for oviposition and larval development, are unimportant but maintain a small population of *Simulium* throughout the dry season ;

(2) *Pennisetum nodoflorum* and the sticks of the fish traps in the river near Leopoldville are used intensively for breeding during the floods ;

(3) small flowering plants and stones are used only during the height of the spate from March–April ;

(4) the development from the egg to the adult takes 9 days, and the emerged female lives about 3 weeks.

The biology of the *S. damnosum* adult is described, and details are given of the density, seasonal frequency and infection rates. The fly is most aggresive before a storm or after rain, and biting occurs all day when the sky is overcast, but under a clear sky it is most frequent in the morning and evening. The flies avoid direct sunlight, and after direct exposure in a glass tube, young adults died in 10 minutes. During the rains females may wander far from the breeding places and the usual biting density in Leopoldville is 10 bites per minute, in an area 500 yards from the river. The author considers that the riverine forest offers an excellent microclimate for the migration of the adult from the breeding sites, but that this does not usually exceed 35 km. Climatic factors influencing migration are discussed ; migration is greatest on a calm day. Biting mechanisms, feeding habits and the ovarian cycle are also considered.

S. albivirgulatum and *S. faini* are considered together. They bite man, dogs, goats, pigs and ducks. Both species breed on aquatic plants in small rivers in the Congo basin ; these rivers are usually slow-flowing with clear water and with a stony or sandy bottom. Breeding occurs away from the shade of trees, and sunlight is essential for larval development. The population is highest in the dry season and lowest in the rains.

The complete developmental cycle of *Onchocerca volvulus* in *S. damnosum* is described but only incomplete development has been obtained in *S. albivergulatum* and *S. faini*. The infection rate in nature corresponds with the laboratory results. Of nearly 3,000 *S. damnosum* caught within 30 km. of the chief breeding places 6·2 per cent. harboured developing forms, and in 1·76 per cent. infective forms were found. In 2,500 *S. albivirgulatum* 0·53 per cent. harboured "sausage" forms but no infective forms were found.

The symptomatology of infections with O. volvulus

The general symptoms during the incubation period include transient urticaria and a raised eosinophile count which occurs early and is a most constant feature. There is a slightly raised temperature, insomnia, and itching and thickening of the skin particularly in European patients. The mechanism of the production of these skin reactions is discussed but no firm conclusion is drawn. On treatment with hetrazan these signs disappear after an exacerbation, but usually after 2 years they recur. The indigenous population have few subjective complaints, the local signs in these cases being confined to nodules and to swelling of the face.

Nodules occur mostly round the pelvic girdle. Sclerosed nodules enclosed in loose folds of skin, without elephantiasis of the legs or scrotum, occur in 67 per cent. of the population of Leopoldville. The ocular changes are related to the intensity and duration of infection rather than the site of the nodules ; superficial and corneal lesions occur first, then an iridocyclitis.

Survey methods

The method of survey used in Leopoldville involves scratching the skin 4 or 5 times with a vaccination needle, and the blood-stained exudate is mixed with physiological saline and stained with Giemsa ; the left shoulder is mainly used for the scarification. The incidence of infection in Leopoldville assessed by this method showed that 67 per cent. of 2,500 Africans and 45 per cent. of Europeans were positive, and that most of the other Europeans had the early allergic symptoms. No cutaneous microfilariae were found in domestic animals such as the dog, pig, goat, in bovines or the horse. The fishermen near the islands opposite Leopoldville showed a high rate of infection ; further down stream the incidence of infection diminished.

The control of onchocerciasis

The difficulties in control are suggested by the results of previous investigations which showed a large reservoir for infection to the fly, a large population of Simuliidae and their widespread breeding places and a high infection rate. As it was impossible to move the fishing villages which were the chief reservoirs, an attempt was made to spray the resting places in the tall grass near the villages and in the nearby European gardens, with but little success because of the rapid growth of the new grass. Mechanical destruction of the breeding places in the river opposite Leopoldville was tried in 1943, and the population of Simuliidae fell to one-sixth in the next year. Antilarval control by insecticides was considered but the dose which would be effective when given in the principal turbulence of the river was so enormous because of the volume of water flowing during the wet season (26,000–75,000 cubic metres per second) that it was found to be impracticable. DDT and Gammexane were sprayed by air on the resting places of the males and females on the vegetation of the islands in the rapids. The males feed on the flowers in the island bushes and the gravid females rest on the leaves, where they wait to complete the three days of the reproductive cycle. Thus the zones of reproduction and not those of dispersal were treated. The practical details are given in full. DDT was found to have a residual effect of two days ; Gammexane had little residual effect in the hot and wet climate of Leopoldville. Spraying was done on alternate days on the islands and breeding places as the floods were rising—from 10th October to 4th November. In 3 weeks the larval breeding sites were clear.

Chemotherapy of onchocerciasis

The chapter on chemotherapy is devoted principally to the use of Antrypol. In early trials 2 gm. were given twice weekly, with violent general reactions. In a later trial ½–1 gm. intravenously was given once or twice weekly without toxic reactions, and on this basis two courses were then used. In a course in which a total of 5 gm. was given 74 patients were treated with no major reactions ; 40 Europeans who were lightly infected were cured, the eosinophile count remaining normal for 12–15 months after treatment. Of 34 Africans heavily infected 10 per cent. were cured, but in 90 per cent. microfilariae persisted up to 42 months, although they were found in smaller numbers. In a course in which 10 gm. were given, 72 Africans were treated and a 4-year follow-up showed that 70 were cured while in 2 microfilariae persisted.

Antrypol appears to act on the adult worm, and the numbers of microfilariae then fall after 6 or 7 gm. of the drug have been injected. It does not appear to be effective against any other filariae such as *L. loa*, *W. bancrofti*, *D. perstans*, *D. streptocerca*, or *L. carinii*. [Antrypol has been found by other workers to be effective against *L. carinii* in the cotton rat.] The reactions to the drug, which appeared after 5 or 6 gm. had been given, such as a rise in temperature, joint pains, itching of the skin and congestion of the conjunctiva, did not render the drug unpopular, and at the end of the treatment the patient had lost

between 4 and 10 lb. in weight. The mechanism of action of Antrypol is discussed in detail.

Hetrazan was used in doses of 6–10 mgm. of base per kilo. per day. An initial dose of 50 mgm. given to all the patients treated with this drug produced violent allergic reactions which appeared within 2 hours after administration, reaching their peak one day later, and this reaction made treatment with this drug unpopular. Though the microfilariae disappeared rapidly they returned in 2–4 months and there was no fall in the eosinophile count. *W. E. Kershaw*

KITAMURA, K. **Gnathostomiasis in Japan.** *Arch. Dermat. & Syph.* 1952, Aug., v. 66, No. 2, 276–81, 5 figs. [Refs. in footnotes.]

A brief historical review of Yangtse oedema, which has occurred occasionally during the past 50 years in Japanese people who have lived in the Yangtse Kiang Valley in China, is followed by two case histories of autochthonous gnathostomiasis in Japan. Hitherto the only native record of this infection in Japan was that of KINOSHITA's case of creeping disease (reported in a Japanese journal in 1924).

Case 1. A 14-year-old Japanese boy of Kitagata became ill after eating raw fish, " Taiwan-dojo " (*Ophicephalus argus* and *O. tadianus*) and 3 weeks later a swelling appeared on the right hypochondrium which disappeared after 10 days and reappeared for 10 days on the left hypochondrium. Later the skin of the abdomen became indurated, erythematous and swollen. There was an eosinophilia of 45 per cent. and the leucocyte count was 16,500 per cmm.

A fish from Kitagata of the kind the boy had eaten was examined and an encysted larva of *Gnathostoma spinigerum* was found in the muscles.

Case 2. A 28-year-old labourer, who frequently consumed the kind of fish mentioned above, was affected by cutaneous swellings successively on the right axilla, abdomen and right side of chest between May, 1945 and March, 1946 and on the face in October, 1948. The leucocyte and eosinophile counts were 10,000 per cmm. and 21 per cent. respectively. Various parts of the face and head were subsequently affected. Excision and histological examination of a portion of a swelling near the right angle of the mouth revealed a larval gnathostome in the lower layer of the corium, with a dense infiltration of eosinophiles. The paper is illustrated with photographs of the swelling (case 1) of the fish and of the encysted larva. There is also a photomicrograph of the larva in the skin in the second patient. *J. J. C. Buckley*

SCHOLTEN, C. Die Behandlung der Oxyureninfektion mit Triphenylmethanfarbstoffen auf Grund neuer pharmakologischer Erkenntnisse. [**The Treatment of Thread Worm Infection with Triphenylmethane Dyes on the Basis of Newer Pharmacological Knowledge**] *Ztschr. f. ärztl. Fortbildung.* 1952, Oct. 1, v. 46, No. 19, 582–4. [16 refs.]

In this short article reference is first made to the difficulties in the treatment of enterobiasis which lie in the ease with which the infection is transmitted, the frequency of reinfection and the lack of efficient medicaments. At the present time there are 3 preparations which may be considered as of value in human infections, namely :—phenothiazine, Egressin and the triphenylmethane series of dyestuffs and their corresponding colourless carbinol bases. The dyestuffs which have been found to be effective are derivatives of p-rosanilin, namely, gentian violet, methyl violet, crystal violet and malachite green. They have, however, the disadvantages of being irritant to the gastric mucous membrane

and, being soluble in both water and alcohol, are readily absorbed into the system. These disadvantages may be avoided by using the carbinol base of the dyestuff. This carbinol base is colourless, relatively insoluble and has, in animal experiments, a much lower toxicity than the corresponding dyestuff. Acid reactions convert the carbinol base into the dyestuff and it must therefore be given in coated tablets resistant to the acid of the stomach. In the intestine it is absorbed into the digestive tract of the parasite and is there converted by the acid reaction into the therapeutically active dyestuff. A very effective preparation of such a carbinol base is being used in Germany under the name of Atrimon. The dose of this for an adult is 180 mgm. per day (each dragee contains 20 mgm.) and the treatment continues for 7 days. The chemical must be pure and it should be given fasting or before meals. Alcohol during treatment is to be avoided.

M. E. Delafield

Coutelen, F., Biguet, J., Obez, A. & Lefrançois, R. Remarques sur l'emploi, contre l'oxyurose, de l'ester thymolique de l'acide N-isoamylcarbamique. [**Observations on the Use of the Thymolic Ester of N-isoamylcarbamic Acid in Enterobiasis**] *Bull. Soc. Path. Exot.* 1952, v. 45, No. 4, 465–9. [14 refs.]

Reference is made to some synthetic carbamates which have been used in the treatment of enterobiasis, to introduce a description of the experience of various workers and of the authors of the present paper with the substance named in the title. It is 3-methyl-6-isopropylphenyl ester of N-isoamylcarbamic acid (known as "Egressin")—white crystals soluble in organic solvents but having a low solubility in water. The dosage for children between 2 and 12 years is 1 gm. 3 times a day for 2 consecutive days given by mouth. For adults the dosage is doubled. Treatment is followed by non-oily purgation.

The results of the treatment of 20 children (of whom 5 were controls) with daily measurements of the extent of infestation are given as about 40 per cent. of cures, improvement in 22·7 per cent. of cases and 10 per cent. of failures. In more than one-third of the children there were symptoms of intolerance such as headache, nausea and vomiting. This experience appears to be less promising than that obtained by the other workers to whom reference is made. [For previous work on Egressin, see this *Bulletin*, 1950, v. 47, 1025; 1951, v. 48, 186, 187, 188.]

M. E. Delafield

Hsieh, K. N. **The Effect of the Standard Pinworm Chemotherapeutic Agents on the Mouse Pinworm** *Aspiculuris tetraptera*. *Amer. J. Hyg.* 1952, Nov., v. 56, No. 3, 287–93.

"1. The relationship of *Aspiculuris tetraptera* to 6 standard drugs used against the human pinworm (gentian violet, phenothiazine, tetrachlorethylene, egressin, hexylresorcinol and diphenan) was determined.

"2. All 6 of these drugs showed some degree of effectiveness against *Aspiculuris tetraptera*. They reduce the worm burden, the length of worms, or the fecundity of worms, or all three.

"3. The order of effectiveness of these 6 drugs against *Aspiculuris tetraptera* is the same as that in the case of *Enterobius vermicularis*. Of these, the reduction in worm burden by phenothiazine, gentian violet and tetrachlorethylene are statistically significant, whereas the reduction of worm burden by egressin, hexylresorcinol and diphenan is not significant.

"4. *Aspiculuris tetraptera* is useful for drug screening for *Enterobius vermicularis*."

Scott, R. A., Johnson, R. E. & Holzman, D. **Trichinosis with Neurologic and Mental Manifestations.** *New England J. of Med.* 1952, Oct. 2, v. 247, No. 14, 512–14. [17 refs.]

"Three cases of trichinosis with varying degrees of central-nervous-system involvement are presented, and the neuropathological features of this disease are briefly reviewed.

"Severe neurologic defects may occur with but few of the usual symptoms and signs of trichinosis, thereby presenting a problem in diagnosis.

"All 3 patients showed electrocardiographic abnormalities."

DEFICIENCY DISEASES

Lal, S. B. **Changes in Dietary Habits and Physique of Hos.** *Indian J. Med. Res.* 1952, Apr., v. 40, No. 2, 193–201.

Sen Gupta, P. N. **Investigations into the Dietary Habits of the Aboriginal Tribes of the Abor Hills (North-Eastern Frontier). Part I. Padam Areas.** *Indian J. Med. Res.* 1952, Apr., v. 40, No. 2, 203–18. [11 refs.]

Pallister, R. A. **Beriberi and other Nutritional Disorders of the Heart.** *Med. J. Malaya.* 1952, June, v. 6, No. 4, 207–18. [42 refs.]

This address reviews the literature and adds the author's experience of cardiac beriberi and various heart conditions that have been attributed to nutritional deficiencies.

Gillanders, A. D. **Nutritional Heart Disease.** *Brit. Heart J.* 1951, Apr., v. 13, No. 2, 177–96, 11 figs. [57 refs.]

This paper describes the condition of 30 Bantu patients of both sexes, aged 30 to 63 years, who suffered from severe oedema. On fluoroscopy the whole heart was found to be enlarged and the biopsy section of the liver showed disease in all cases. In 19 the salient lesion was cytosiderosis. All the patients had been living on poor maize diets, inadequate in both quantity and quality. In all but the most advanced cases oedema subsided and the heart size diminished following rest in bed and a good diet. The condition is attributed to a failure of the heart consequent on a prolonged period of under-nutrition. *R. Passmore*

Trowell, H. C.; Davies, J. N. P.; Dean, R. F. A. **Kwashiorkor. I. Nutritional Background, History, Distribution, and Incidence** [Trowell & Davies]. *Brit. Med. J.* 1952, Oct. 11, 796–8. [37 refs.] **II. Clinical Picture, Pathology, and Differential Diagnosis** [Trowell, Davies & Dean]. *Ibid.*, 798–801, 2 figs. [19 refs.]

This authoritative review by acknowledged experts is recommended to all who are unfamiliar with the disease. It should be made obligatory reading for medical men and women going to Africa for the first time. *R. Passmore*

Dean, R. F. A. **The Treatment of Kwashiorkor with Milk and Vegetable Proteins.** *Brit. Med. J.* 1952, Oct. 11, 791–6, 5 figs. [16 refs.]

The beneficial effects of milk proteins in the treatment of kwashiorkor are again reported. However, as the author points out, these are always expensive and seldom obtainable in adequate amounts in those parts of the world where the

disease is common. This paper describes excellent therapeutic results obtained with plant proteins in infants and young children. Steady clinical improvement occurred on a diet containing 65·5 gm. of protein (6·5 from banana, 8 from maize and 51 from soya bean). The soya bean is perhaps the most valuable source : procedures are described for concentrating the protein and rendering the beans easily digestible. Cooking bananas (plantains) and sweet bananas were found to be excellent vehicles for the proteins, as well as providing carbohydrate in a form which is well tolerated. The theoretical importance of a good mixture of plant proteins is emphasized and there is a need for long-term experiments with various mixtures. *R. Passmore*

SATO, Y. & ARAKAWA, T. **Hepatomegalic Liver in Children with Chronic Miliary Tuberculosis and Liver Biopsy Findings. (Studies upon the Nutrition of Children in Hirosaki Area. 11th Report.)** *Tohoku J. Exper. Med.* 1952, June 25, v. 56, Nos. 1 /2, 59–63.

" The marked liver enlargement or hepatomegalic liver in children of chronic miliary tuberculosis in Hirosaki Area is, taking liver biopsy findings into consideration, chiefly ascribed to the form of diffuse fatty liver due to nutritional dystrophy prevalent in the Area."

WADA, S. & ARAKAWA, T. **Blood Picture of Nutritional Dystrophy in Children ; Effect of Folic Acid and Vitamin B_{12} upon it. (Studies on the Nutrition of Children in Hirosaki Area. 10th Report.)** *Tohoku J. Exper. Med.* 1952, June 25, v. 56, Nos. 1 /2, 47–57. [10 refs.]

" 1. In summer and winter 1950–1951, blood picture was examined on school children at a rural village (Miyoshi village) in Tsguaru District. Though they were apparently healthy, yet they were found to be in a state of nutritional dystrophy on close examination.

" 2. Macrocytic anemia was found in 35 cases (76·0%) out of the 46 cases examined in winter, and in only 5 cases (13·1%) out of the 38 cases examined in summer.

" 3. Macrocytic anemia observed in winter responded sharply to folic acid and scarcely to vitamin B_{12}. The method of administration was subcutaneous.

" 4. Decrease in total white cell count or in eosinophile count was observed in a majority of the cases treated with folic acid, but only in a minority of those treated with vitamin B_{12}."

SPRUE

NEUFELD, O. E. **A Rapid Method for determining Faecal Fat.** *J. Clin. Path.* 1952, Aug., v. 5, No. 3, 288–9, 1 fig.

WOODRUFF, A. W. **The Absorption of Olive Oil from the Intestine in Rats deprived of Pteroylglutamic Acid, Biotin and Pyridoxin.** *Brit. J. Exper. Path.* 1952, Aug., v. 33, No. 4, 415–17.

In view of the suggestion that sprue might be a deficiency disease due to lack of vitamins B_2 in the bowel, studies of the effect of these vitamins on intestinal fat absorption have been undertaken. FRAZER [this *Bulletin*, 1950, v. 47, 75] showed riboflavin, nicotinamide, pyridoxin, and pantothenic acid to have no effect on fat absorption. The present author [*ibid.*, 1951, v. 48, 65] showed that pteroylglutamic acid or biotin deficiency or both do not impair the absorption of

oleic acid in rats. He has now studied the effect of these deficiencies on the absorption of neutral fats in rats, in view of Frazer's opinion that sprue is due to diminished absorption of neutral fats, which are hydrolysed to long-chain fatty acids and so cause many of the sprue symptoms.

In accordance with his original technique, vitamin-free arachis oil and vitamin-free maize and starch were given to rats in food to induce a pyridoxin deficiency ; sulphasuxidine was given to depress the synthesis of the B vitamins in the bowel. Vitamin supplements were given to the control animals, but pyridoxin was withheld from the pyridoxin-deficient group of animals. When the deficiency was established, 1 ml. of olive oil was introduced by stomach tube, under anaesthesia, after 24 hours' starvation ; the distribution of the oil after 6½ hours was then studied. The results [set out in a table] on analysis showed that there was no marked impairment of absorption of fat from the small intestine in any of the animals. The author concludes from these, and from other yet unpublished data, that the defect in fat absorption in sprue is not due to deficiency of the B vitamins. *A. R. D. Adams*

ROMERO, C. A., VIZCARRONDO, R. & RODRIGUEZ-MOLINA, R. **Treatment of Sprue with Folinic Acid : Report of Nine Cases.** *Amer. J. Med. Sci.* 1952, July, v. 224, No. 1, 9–22, 7 figs. [17 refs.]

Folinic acid is an active principle isolated from enzymatic digests of liver. It was shown to be 10 to 100 times more active than folic acid in overcoming the inhibition of certain bacteria caused by folic acid antagonists.

This active principle appears to be identical with a factor present in commercial liver extracts which was found to be necessary for the growth of the organism *Leuconostoc citrovorum*. A functional and structural relationship between citrovorum factor or folinic acid and folic acid has been demonstrated. The first clinical report on its use was made in 1950 by SPIES and his co-workers [this *Bulletin*, 1951, v. 48, 399]. In pernicious anaemia and megaloblastic anaemia of infancy the haemopoietic activity of citrovorum factor is similar to that of folic acid.

Nine cases of sprue were selected for this report. The symptoms and findings in this group are similar to those of 100 cases of sprue carefully analysed by Rodriguez-Molina in 1941 [*ibid.*, 1942, v. 39, 638].

Three patients were treated with 100 to 400 units of folinic acid intramuscularly for 12 days. All these exhibited haematological and clinical improvement of a standard that was considered inadequate, so it was decided to increase greatly the dosage of folinic acid given to six other patients. Therefore 1,000 daily units of folinic acid were given by intramuscular injection for 12 days, with the result that the clinical symptoms of the disease were rapidly and effectively controlled in all. The haematological improvement was adequate in 5 and submaximal in 1. There were no untoward effects.

It is argued that folinic acid is qualitatively as effective as folic acid in the treatment of sprue. Weight for weight this substance appears to be 10 to 15 times more active than folic acid in the treatment of sprue. Detailed clinical rates and charts are given. *Philip Manson-Bahr*

SUÁREZ, R. M., SABATER, J., SUÁREZ, R. M., Jr. & BUSO, R. **The Effect of Sublingual Administration of Crystalline Vitamin B_{12} in Tropical Sprue.** *Blood.* 1952, July, v. 7, No. 7, 749–54, 5 figs.

" Sublingual administration of crystalline vitamin B_{12} in daily doses of 25 μg for ten consecutive days failed to induce clinical or hematologic remissions in 5 patients with tropical sprue."

HAEMATOLOGY

JALILI, M. A. & DEMARCHI, M. **Classification of Anaemias in Iraq.** *J. Faculty of Med., Baghdad, Iraq.* 1952, v. 16, Nos. 3/4, 71–100, 4 figs. [72 refs.]

A study has been made on Iraqi patients above 10 years of age with a haemoglobin level below 7 gm. per cent. Altogether, 130 such cases were classified according to mean corpuscular volume and mean corpuscular haemoglobin concentration : 30·8 per cent. were microcytic, 48·4 per cent. normocytic and 20·8 per cent. were macrocytic. Normal values were obtained from 14 men and 5 women and were found to be identical with those seen in Europe and America. Little is said about how these normal persons were selected and one wonders whether they are really optimal rather than normal findings ; this arises particularly because the authors say that in a group of 20 doctors and medical students only 10 had a haemoglobin above 12·6 gm. per cent. The most important cause of anaemia was ankylostomiasis. The second important cause was malarial infection. Microcytosis was due to iron deficiency. The macrocytosis seen was due to pernicious anaemia in only two cases. In ankylostomiasis and malaria the cause was an increase of reticulocytes in the peripheral circulation, the picture being one of loss of red cells in the periphery with the bone marrow attempting to overcome the loss of cells by increased production. The abstracter has called this picture " pre-coctic " which was meant to signify production of large cells in regeneration, some of the cells being reticulocytes and some of them being early post-reticulocytes. The authors do not approve of this nomenclature because they did not see any evidence that the reticulocytes in this condition were different from any other ordinary ones. [Actually the term " pre-coctic " was not intended to describe reticulocytes only, but was supposed to include all macrocytes developed owing to hyperactivity of the bone marrow.] *H. Lehmann*

DREYFUSS, F., IKIN, Elizabeth W., LEHMANN, H. & MOURANT, A. E. **An Investigation of Blood-Groups and a Search for Sickle-Cell Trait in Yemenite Jews.** *Lancet.* 1952, Nov. 22, 1010–12. [15 refs.]

" Among 104 unrelated Yemenite Jews no sickle-cell trait was found when their blood was reduced by chemical means.

" Their blood-group picture resembles that of the peoples of Europe and Western Asia and the white peoples of North Africa.

" Their Rh chromosome cDe has a frequency of 1·4%, compared with about 2% in Europe and more than 50% in Negroes.

" Their chromosome $cD^{u}e$ has the exceptionally high frequency of 20%. The only other known community with a comparable frequency is that of the Touaregs (North-African whites)."

COLLIER, W. A. & DE LA PARRA, D. A. **Sickle-Cell Trait in Surinam Creoles.** *Documenta Med. Geograph. et Trop.* Amsterdam. 1952, Sept., v. 4, No. 3, 223–5. [30 refs.]

" In Paramaribo, Surinam, 88 out of 789 unselected Creoles were found to have the sickle-cell trait (11·2 per cent). None of the 231 non-Creoles in the same investigation gave a positive reaction."

NEUDA, P. M. Sichelzellen-Anämie und Anämien von Sichelzell-Typus. [**Sickle-Cell Anaemia and Anaemias of the Sickle-Cell Type**] *Zent. f. Bakt.* I. Abt. Orig. 1952, June 30, v. 158, Nos. 3/5, 299–304, 5 figs.

The author incubated normal human faeces in nutrient broth. After 24 hours the broth contained an enzyme which destroyed blood group substances A, B,

and O. This substance is thought to be identical with " the blood group property destroying factor " found by SCHIFF and WEILER (*Biochem. Z.*, 1931, v. 235, 454) in human intestines. When this enzyme was added to the red cells of a sickle-cell trait carrier sickling was produced within 5 to 20 minutes. The factor also affected the red cells of non-sicklaemic persons who were suffering from Hodgkin's disease or liver cirrhosis ; their cells did not sickle but broke up into oblong fragments. The author suggests that enzymatic lysis of abnormal red cells produces separation of two haemoglobins ; one is normal, water-soluble and non-light-refractory. The other—abnormal—is hydrophobic and therefore precipitates and is strongly light-refractory. *H. Lehmann*

LUDWIN, I., LIMENTANI, D. & DAMESHEK, W. **Linkage Tests of Mediterranean Anemia with Blood Groups, Blood Types, Rh Factors and Eye Color.** *Amer. J. Human Genetics.* 1952, Sept., v. 4, No. 3, 182–93, 1 fig. [29 refs.]

" The transmission of Mediterranean Anemia by an incompletely dominant autosomal gene is supported by the evidence here presented. The severe form of Mediterranean Anemia is attributed to the homozygous condition of the responsible gene, while the milder condition is due to the heterozygous ' carrier ' state. The varying severity observed is explained as being due to modifying factors (also hereditary) which condition the severity of the disease caused by the primary gene.

" Using Finney's method no evidence was found of linkage between Mediterranean Anemia and the blood groups, the blood types, Rh factors, phenyl-thiocarbamide taster, or blue eye color.

" The need of studies on very young infants to determine the onset of Mediterranean Anemia is pointed out."

NEEL, J. V., SCHULL, W. J. & SHAPIRO, Harriett S. **Absence of Linkage between the Genes Responsible for the Sickling Phenomenon, the MN Blood Types, and the S-Agglutinogen.** *Amer. J. Human Genetics.* 1952, Sept., v. 4, No. 3, 204–8. [10 refs.]

PASCHER, Frances & KEEN, R., with the technical assistance of Florence SIMM. **Chronic Ulcers of the Leg associated with Blood Dyscrasias.** *Arch. Dermat. & Syph.* 1952, Oct., v. 66, No. 4, 478–87, 4 figs. [Refs. in footnotes.]

" The cases of five patients with blood dyscrasias who sought dermatologic care because of chronic leg ulcers are presented. The hematologic entities represented in this group are 1 case of sickle cell anemia, 1 case of Mediterranean anemia, 1 case of congenital (?) hemolytic icterus, and 2 cases of polycythemia. These cases are described in detail, and the importance of a consideration of the blood dyscrasias in the differential diagnosis of leg ulcers is emphasized."

See also p. 142, WADA and ARAKAWA, **Blood Picture of Nutritional Dystrophy in Children ; Effect of Folic Acid and Vitamin B_{12} upon it. (Studies on the Nutrition of Children in Hirosaki Area. 10th Report.)**

VENOMS AND ANTIVENENES

SINSHEIMER, R. L. & KOERNER, J. F. **A Purification of Venom Phosphodiesterase.** *J. Biol. Chem.* 1952, Sept., v. 198, No. 1, 293–6.

IRWIN, R. S. **Funnel-Web Spider Bite.** *Med. J. Australia.* 1952, Sept. 6, v. 2, No. 10, 342.

A boy of 7 in Glen Innes, New South Wales, was bitten on the upper arm by a large spider. Suction and a tourniquet were applied at once and an hour later in hospital, the boy's condition was quite good. He was given injections of morphine, atropine and, later, of 10 ml. of 10 per cent. calcium gluconate solution, the last-named intramuscularly.

Early next morning, he was collapsed, with rapid respiration and bubbling râles all over his chest. He appeared to be moribund, and as heroic measures were indicated, the author instituted venesection, injection of 1/50 grain of atropine and 3,000 units of tiger snake antivenene. The last treatment was given as it is recommended in any snake bite, and since a neurotoxin predominates in the venom both of most Australian snakes and of venomous spiders it was believed that the antivenene was worth trying, as it is apparently harmless.

By midday the patient had greatly improved. The calcium gluconate injections were continued every 4 hours. Next day the boy appeared to be quite normal and he was discharged 3 days later.

The spider was identified as a male *Atrax formidabilis* the "North Coast funnel web", which is distinct from the Port Jackson species, *Atrax robustus*, which occurs in suburbs north of Sydney Harbour and is well known. This appears to be the first record of the species as far west as the Northern Tablelands.

The author refers to the case reported by MURRAY [this *Bulletin*, 1950, v. 47, 1123] where symptoms were few and no treatment was apparently indicated. In the present case antihistamines were not given: the dramatic recovery without them casts doubt on their importance, though it is admitted that Benadryl on the first night might have prevented the serious condition the next morning.

It is not claimed that the tiger snake antivene was effective. The author considers that venesection and atropine together had dealt with the pulmonary oedema.

H. J. O'D. Burke-Gaffney

DERMATOLOGY AND FUNGUS DISEASES

NELSON, J. W. **Pachyderma. I. The Natural History.** *Trans. Roy. Soc. Trop. Med. & Hyg.* 1952, Sept., v. 46, No. 5, 538–42, 7 figs. on 2 pls.

Pachyderma is a condition of roughness and thickening of the skin, most marked on the dorsal surfaces of the feet and often associated with cracking of the heels.

In the active stage the skin becomes rough and dry with accentuated creases, and a dusty, shabby appearance. In the quiescent stage the skin is thick, pale, loose and inelastic like a dirty leather glove, an appearance referred to as elephant skin. Both stages are illustrated by photographs. From observations at the Choma Government School, Northern Rhodesia, the author found pachyderma to be uncommon in children under 5–6 years, and much less common in girls than in boys. While young children and girls feed with the women, boys of 5 years old and upwards eat with the men. The main food

consists of thick maize, cassava or millet meal porridge, balls of which are dipped in a relish before eating. The relish is composed of beans and greens served when possible with pounded groundnut sauce. The boys are only allowed a limited quantity of this relish, and often go hungry, particularly between January and March. During the hunger season the maize and millet crops are finished or very short, and diet is based on wild fruits, mushrooms, roots, greens and insects gathered by the women who range through the forest in search of them. It is at this season that pachyderma is least common.

H. T. H. Wilson

Campos, J. A. Invasão do pênfigo foliáceo na América do Sul. [**Dissemination of Pemphigus Foliaceus in South America**] *Arquivos de Dermat. e Sifiligrafia de São Paulo.* 1952, Jan.–June, v. 14, Nos. 1/2, 12–20. [16 refs.]

Kahn, R. L. & Gutierrez Villegas, L. **Universal Serologic Reaction in Pinta.** *Amer. J. Syph.* 1952, Sept., v. 36, No. 5, 468–75, 5 figs.

The " universal " reaction is flocculation with lipid antigen in the presence of various concentrations of NaCl, *i.e.*, 0, 0·15, 0·6, 0·9, 1·2, 1·8, and 2·1 per cent., and three different periods of incubation. In health in 80 per cent. of persons there is some flocculation with the low and high dilutions of NaCl, and in 20 per cent. this is somewhat stronger especially in the higher concentrations. In lepromatous leprosy the greatest flocculation occurs in the low concentrations, in malaria there is considerable flocculation in all concentrations ; this is similar in tuberculosis but occurs most when cold incubation is employed. It is suggested that the reaction in health is due to natural antibodies and in disease to acquired antibodies resulting from tissue breakdown.

In pinta the reaction is exactly the same as in syphilis. This opinion is based on 15 sera from patients who had suffered from the disease for varying periods up to 30 years. The reaction is similar to that in yaws but not identical ; bejel and yaws appear to give similar reactions.

In order to appreciate the universal reactions in these diseases, and to compare them, the figures in this article should be studied. [See also this *Bulletin*, 1951, v. 48, 997.]

T. E. Osmond

TROPICAL OPHTHALMOLOGY

World Health Organization. Technical Report Ser. No. 59. **Expert Committee on Trachoma. First Report.** 22 pp. Geneva : 1952, Sept. [1*s.* 3*d.* ; $0·15 ; Sw. fr. 0·60.]

This report contains the collective views of an international group of experts and does not necessarily represent the decisions or the stated policy of the World Health Organization.

It contains chapters on the chemotherapy of trachoma ; methods of trachoma control applicable in under-developed countries ; prophylaxis of trachoma in international traffic ; observations on international co-operation in trachoma research ; classification of trachoma and a miscellaneous chapter which deals with the various forms of onset of trachoma, and keratoplasty.

There are also an annex on problems considered suitable for co-operative research on an international level and a second annex on problems considered suitable for individual research.

In the present state of knowledge the Committee recognizes that the most effective treatment for trachoma is the simultaneous use of certain antibiotics with sulphonamides, the former being administered locally and the latter orally. Aureomycin and terramycin are considered particularly active on the causal agent of the disease, and preferably are used in the form of a 1 per cent. ointment : for mass treatment, this is applied four times daily without interruption for a period of two months.

It is advisable to use the least toxic sulphonamides *viz.* : potassium and sodium salt of p-sulphonamido-phenyl-azosalicylic acid, sulphacetamide, polysulphonamide mixtures, dimethyl-sulphanilamido-isoxazole, etc. These are given in a dose of 40 to 50 mgm. per kgm. of body weight divided into 2 to 4 doses.

The Committee consider that as more and more effective medical treatment of trachoma becomes available to ophthalmogists, mechanical adjuncts will become less and less necessary. Nevertheless, in certain cases, very gentle and non-traumatizing expression of soft follicles is permissible, as is also the painting of the conjunctiva with slightly caustic solutions (*e.g.*, 1 per cent. or 2 per cent. silver nitrate, copper sulphate, etc.) or the instillation of such solutions into the conjunctival sac. The report is excellent and for those interested in trachoma should be read *in toto*.

E. W. O'G. Kirwan

PARSONS, H. E. **Nematode Chorioretinitis. Report of a Case, with Photographs of a Viable Worm.** *Arch. Ophthalmology*. 1952, June, v. 47, No. 6, 799–800, 1 fig.

It is believed that this case is the first in which a viable subretinal worm has been photographed and reported. The worm was considered to be an immature *Ascaris* and during the examination of the retina a small white thread-like mass was seen to move from the form of a circle into a figure 8, then into a figure 6 and then back again into a circle. It was about one disk diameter in length, white, non segmented and tapered at each end. On occasions it was extremely active. There was almost complete destruction of the macular area and vision in the eye was reduced to 6/200. The worm was observed in many areas of the fundus and apparently remained of the same size during the 3 years it has been under observation. Various forms of treatment in an effort to destroy the worm have been tried without success. The appearances are shown in 3 photographs.

E. W. O'G. Kirwan

RODGER, F. C. **Nutritional Amblyopia. A Statistical Report of the Course and Progress in Two Hundred Thirty-Eight Cases.** Reprinted, with additions, from *Arch. Ophthalmology*. 1952, May, v. 47, 570–83, 1 fig. [Refs. in footnotes.]

A clinical description of 238 cases of nutritional amblyopia is given at some length, with a discussion of the symptoms and signs as they arose.

The subjects for this research were all former Far-Eastern prisoners of war. Their visual histories dated from 1939 over a period of 10 years.

With a high carbohydrate diet, low in all the respiratory-enzyme vitamins, the ganglion cells in the central part of the retina and in a few instances their processes up to and even beyond the chiasma, underwent deterioration in the persons afflicted. The visual defect developed suddenly and resulted in great depression of the acuity of vision.

After the patients received full diet, of 211 patients the vision further deteriorated in 37·9 per cent., improved in 29·4 per cent., and remained static in 32·7 per cent. The central scotoma characteristic of this amblyopia remained comparatively unchanged, but the slight temporal pallor seen in the subacute stage advanced to a well-demarcated optic nerve atrophy, which bore no relation to the degree of functional loss.

The fact that in so many cases the fields did not change suggests that no inflammatory element exists, so that the frequently applied term retrobulbar neuritis is a misnomer. The absence of change also suggests that the disease is probably non-vascular in nature and that the changes in the acuity of vision are unlikely to be due to glial proliferation. The author suggests that the amblyopia is toxic in origin and that all the evidence is in favour of the belief that this toxin is endogenous. The results are given in 12 tables and the appearance of the fundus is shown in a figure. *E. W. O'G. Kirwan*

HEAT STROKE AND ALLIED CONDITIONS

Mihail, A. & Lotte, J. L. Considérations sur la pression du liquide céphalo-rachidien chez le noir du Congo. [**Observations on the Pressure of the Cerebrospinal Fluid of Africans in the Belgian Congo**] *Ann. Soc. Belge de Méd. Trop.* 1952, June 30, v. 32, No. 3, 247–54.

The details are set out in a table and the authors give the following summary :—

" The authors show that the pressure of the cerebro-spinal fluid of the Congo negro (Equator Province, Belgian Congo) is higher than the pressure considered normal for white people in Europe.

" They suggest that the pressure of the cerebro-spinal fluid of white people living in tropical climates increases, and that this increase is a sign of the stress, the injuring agent being the tropical sun (other signs of the stress are : loss of memory, headaches, corticosuprarenal deficiency—tropical asthenia—, dyspepsia, tropical gastritis of Lambillon, hypomenorrhea, oligogalactia, usually interruption of pregnancy)." *A. R. D. Adams*

Wadsworth, G. R. **Packed Red-Cell Volume in the Tropics.** [Correspondence.] *Nature.* 1952, Nov. 15, v. 170, 851.

The author quotes evidence that exposure to high environmental temperature can cause a fall in packed red cell volume, and *vice-versa.* As no satisfactory information was available regarding the physiological effect on the packed red cell volume (PRCV) of prolonged residence in warm climates, investigations were made in healthy Asian and European men and women in Singapore. Estimations of PRCV were made in Wintrobe tubes centrifuged for 1 hour at 3,000 r.p.m.

The results are shown in detail in a table, from which it is seen that the mean PRCV of 252 men was 47·35 per cent. and of 78 women 40·80 per cent. : there was no significant racial difference. The results are slightly higher than those found by several workers in temperate climates, and suggest that residence in a warm environment for several months and years is not associated with a fall in PRCV. The fall during shorter exposures found by earlier workers appears to have been a temporary change and the author therefore suggests that recovery of the PRCV might provide objective evidence of complete acclimatization.

H. J. O'D. Burke-Gaffney

ELLIS, F. P. **Thermal Comfort in Warm, Humid Atmospheres. Observations in a Warship in the Tropics.** *J. Hygiene.* 1952, Sept., v. 50, No. 3, 415–32, 7 figs. [24 refs.]

The comfort scale of BEDFORD [*Bulletin of Hygiene*, 1936, v. 11, 735] was submitted to men in a large aircraft repair ship at sea between Singapore, Hong Kong and Japan. At the same time dry bulb, wet bulb and globe temperatures and air velocities were measured in the ship's compartments and on the upper deck. A total of 5,000 replies was received on two voyages, 2,000 when the men had served 6 months and the remainder after 12 months' service in the tropics. The period of the second voyage included 9 days of cooler weather.

The effective temperature below which 80 per cent. of the men reported they were comfortable was 80°F. for the first, and 79°F. for the second voyage. Less than 20 per cent. reported that they were wet with perspiration at effective temperatures of 79°F. and 78°F. for the first and second voyages respectively.

A wide latitude was permitted in clothing worn on the messdecks ; more than 80 per cent. of the men were stripped to the waist when the effective temperature exceeded 80°F.

The average air movement on the messdecks was between 140 and 150 ft. /min. Increasing the air movement greatly increased the proportion of those who felt comfortable above 85°F. dry bulb temperature ; most men found 89 to 91°F. comfortable at air movements between 200 and 400 ft. /min., whereas when the air was " still " (probably between 80 and 100 ft. /min.) less than 10 per cent. were comfortable.

The author has concluded that designers of warships should aim at effective temperatures below 78°F. in messdecks to ensure that men engaged in sedentary or light activities should be reasonably comfortable. This is the temperature zone where experiment has shown that a significant decrease occurs in skilled performance of men who are acclimatized to working at high temperatures.

[The acknowledged effect of acclimatization to heat is to increase comfort and degree of sweating at any given temperature, and to lower the temperature level at which sweating commences. The results for the two voyages appear contradictory in that comfort votes indicate higher acclimatization whereas data on sweating indicate lower acclimatization during the first voyage. The probable explanation is that the men found a slight rise in body temperature less uncomfortable than the appearance of sweat.]

M. L. Thomson

i. ELLIS, F. P. **Hot-Climate Fatigue in the Royal Navy. A Review of Lay Opinion.** *Lancet.* 1952, Sept. 13, 527–31. [11 refs.]

ii. LANCET. 1952, Sept. 13, 524. **Tropical Fatigue.**

i. An attempt was made to ascertain the extent of any changes in health and mental efficiency attributed to hot climates by submitting a voluntary questionary to officers and senior ratings who had served in the tropics in an aircraft repair ship and on shore at Singapore for 6 months, and in a cruiser for 20 months.

Of about 140 replies from these ships 88 per cent. thought they were less efficient than when serving afloat in temperate waters, and of 70 men living ashore two-thirds were of the same opinion. Of those on ships 72 per cent. thought themselves less healthy, but 63 per cent. of those on shore thought their health as good as, or better than, it had been in a temperate climate.

The percentage of men reporting (*a*) reduced efficiency, (*b*) adverse effects probably associated with excessive sweating, and (*c*) other adverse effects, according to the causes to which they attributed them are shown in the following tables :—

(*a*)	*Afloat*	*Ashore*
Lethargy	72	42
Reduced concentration	26	30
Retardation	15	25
Lowered sense of responsibility ...	29	14
Personality changes	26	18
Memory defects	6	18
(*b*)		
Discomfort	57	10
Disorders of sleep	44	4
Skin diseases	48	22
Prickly heat	29	7
Fungus infections	12	3
Sepsis and delayed healing	8	7
Scalp infections	2	0
Ear affections	3	0
Boils	3	4
(*c*)		
Loss of appetite	19	1
Loss of weight	15	3
Indigestion and constipation	10	6
Respiratory infections	8	6
Headache	12	3
General debility	6	1

Loss of weight was reported mainly on the cruiser. It was confirmed from Pulheem examinations that men of more than average weight on this ship had lost 1·7 lb. on the average during 20 months' service.

More than 80 per cent. of all persons replying attributed loss of efficiency mainly to climatic factors. Only 2·5 per cent. considered that domestic, economic or related factors were more important than climate.

After comparing this with other investigations notably that of MACPHERSON [this *Bulletin*, 1951, v. 48, 77] with which it is largely in agreement, the author reaches the conclusion that hot climate fatigue occurs in some persons when the environment causes unevaporated sweat on skin, clothing and bedding ; it is not important in Singapore Island, but becomes increasingly prominent with long service afloat in a tropical climate.

[In a report on a similar questionary issued from the Tropical Research Unit, Singapore, CARPENTER (Medical Research Council, 1949, Applied Physiology Unit, Cambridge, A.P.U. 103/49) noted a different emphasis in the factors causing reduced efficiency. Of 15 replies, 40 per cent. reported decreased physical and mental energy, 100 per cent. memory defects, 70 per cent. reduced ability to concentrate and 40 per cent. unwillingness to accept responsibility. The adverse effect of absence of homes, female companionship and other non-climatic factors were given much greater prominence.]

ii. This annotation reviews work on tropical fatigue and its causation.

Lee and Macpherson [this *Bulletin*, 1948, v. 45, 1114] found deterioration in general efficiency among New Zealand and Australian troops who had served 6 months in New Guinea. Physiological measurements showed little change and it was concluded that psychological factors were largely responsible. Ellis, whose report on tropical fatigue is abstracted above, found that 88 per cent. of men serving afloat in the East Indies Station thought themselves less efficient than in temperate climates. Ladell (*J. Physiol.*, 1951, v. 112, 15*p*), and Weiner [*Bull. Hyg.*, 1950, v. 25, 1038], have shown that Europeans and Africans have substantially the same capacity for acclimatization to heat, but Robinson *et al.* [this *Bulletin*, 1941, v. 38, 671] found that Negro share-croppers were more physically efficient than Europeans in the Southern United States.

It is concluded that tropical fatigue exists and is of undoubted importance to personnel of H.M. Forces and settlers in hot climates, but that its exact nature and aetiology are still obscure.

[Loss of weight was reported by Ellis among men in a cruiser and by Macpherson (*loc. cit.*) in an infantry division after serving 4 months in the tropics. The loss of weight was only significant in men above average weight when first examined.

The possibility should be considered that subclinical sodium chloride deficiency plays a part in the production of tropical fatigue.]

M. L. Thomson

Maegraith, B. G. **Clinical Effects of Exposure to Heat and Sunlight. I. Heat Hyperpyrexia and Thermogenic Anhidrosis.** *Brit. Med. J.* 1952, June 21, 1345–7. **II. Heat Exhaustion and Sunburn.** *Ibid.*, June 28, 1402–4.

These articles contain general accounts of the conditions, but do not report new work. The chief points are as follows:—

I. Heat hyperpyrexia and thermogenic anhydrosis have been considered together because defective sweating is a prominent feature of both conditions.

Heat hyperpyrexia (*heat stroke*). This results from breakdown of the thermoregulatory mechanism and is predisposed to by high temperature and humidity, absence of air movement, ill-designed clothing and muscular work. It is more common in individuals unacclimatized to heat and in the obese and alcoholic.

Prodromal symptoms such as headache, drowsiness, polyuria, anorexia and vomiting may occur but commonly the patient is already delirious or in coma when first seen. Oral temperature is high, sometimes above 110°F. (43°C.). The skin is usually but not invariably hot, dry and flushed. Pulse and respiratory rates are raised, and convulsions, muscular twitchings and neurological abnormality may be present. There are no constant abnormalities in urine or blood ; dehydration and salt deficiency may coexist with associated albuminuria and casts. Large quantities of dilute urine are frequently voided.

The prognosis depends on the height of pyrexia and its duration. Death usually occurs within 24 hours in fatal cases, but may be delayed for 12 days. It is important to exclude *falciparum* malaria which may cause hyperpyrexia indistinguishable from that of heat stroke. It is helpful in diagnosis to remember that defective sweating will cause hyperpyrexia only at extremely high environmental temperatures.

Treatment should aim at reducing body temperature without delay, and should be commenced before the patient is transported to the treatment centre. The skin should be kept moist, and fanned so as to promote evaporative heat loss until the temperature falls to about 102°F., but not lower. The

return of normal sweating may be delayed and during this period recurrence of hyperpyrexia is common. A close watch should therefore be kept on body temperature. [It is advisable, and always safe, to give salt and water by mouth.]

Thermogenic anhydrosis (*Type II heat exhaustion ; tropical dyshydrotic asthenia*). The inhibition of sweating found in this condition is never complete so that high fever has not been reported. Sweat chloride is high and this may indicate fatigue of the sweat glands which have remained active. Many eccrine sweat glands are blocked by keratotic plugs ; the associated ducts may rupture, causing, it is thought, lymphatic absorption of sweat with enlargement of related lymph nodes. Intradermal papules appear during sweating caused by the pressure of sweat.

The condition tends to occur late in the hot season. There is nearly always a history of severe prickly heat. The patient complains of dyspnoea and palpitation after exercise and of giddiness, frontal headache, insomnia, epigastric discomfort, and diminished sweating on the trunk. The symptoms pass off with rest in cooler conditions. The oral temperature ranges from 99 to 102°F. (37·2–38·9°C.). Pulse and respiration rates are raised. The skin shows dry warm areas associated with patches of closely set " sago-grain " papules about one mm. in diameter, many surmounted by vesicles containing clear fluid. There are no characteristic changes in blood or urine.

Patients should be rested in cool surroundings and salt and water prescribed especially where urinary chloride tests indicate salt deficiency. Normal sweating may not return for many weeks and during this period relapses are common ; in some cases it is necessary to remove sufferers from the hot environment.

II. *Heat Exhaustion and Sunburn*

Heat exhaustion. This condition is characterized by changes in body-water salt balance with dehydration, circulatory insufficiency and shock. The body temperature is little raised or subnormal. Predisposing factors are those mentioned under heat-hyperpyrexia with, in addition, insufficient intake of water and common salt.

Sufferers commonly complain of gradually increasing headache, anorexia, nausea, vomiting and cramps during the preceding days. The skin is cold, moist, pale and inelastic ; the eyes are sunken and the cheek bones prominent as a result of dehydration. Breathing is rapid and shallow. [In addition to cramps there may be carpopedal spasms.] The pulse is rapid and thin. Systolic blood pressure and pulse pressure are low and show a precipitous fall on rising from the prone position, with tendency to fainting. There is haemoconcentration with raised haemoglobin and red cell count. Blood chloride is low and blood urea high.

The urine volume is low (500 ml. or less in 24 hours) and there may be complete anuria in severe cases. In these concentrated specimens chloride is low and may be completely absent. The urine may contain albumin and hyaline and granular casts.

Treatment consists in replacement of salt and water, intravenously if necessary. Recovery in most cases is prompt and dramatic and deaths are rare. The process of rehydration can be followed by simple urinary chloride tests or by charting body weight. Many cases can be avoided if constipation in the heat is treated with sodium chloride and not with saline or other purgatives.

Sunburn. This is caused by the shorter wavelengths (2,900–3,200 Å) of the ultra-violet rays from the sun, and diffuse skyshine may cause burns in the absence of direct solar radiation.

A description of this condition is given, and the author discusses local treatment ; antihistamine drugs given orally may relieve discomfort.

Exposure to the sun should be by graded doses on successive days till adaptation to it has developed. Creams which filter U.V. rays may give

considerable protection, *e.g.*, tannic acid (5 per cent.), para-aminobenzoic acid (10 per cent.), quinine hydrochloride (5 per cent.) or salol (10 per cent.) made up as vanishing creams. The possibility of skin sensitivity to these chemicals should be borne in mind.

Among chronic effects of sunlight are included atropy of the epidermis, irregular pigmentation, solar keratitis and summer prurigo which are caused by ultra-violet light, and solar urticaria in which the infra-red rays are active. Some protection may be afforded by agents which filter the active rays.

[In order to complete this list of conditions caused by heat it is desirable to include the simple faint which occurs in the absence of changes in body chemistry. An early reaction to increased temperature is skin vasodilatation ; a considerable proportion of the blood is pooled in the skin, causing cerebral ischaemia. It is suggested that this might be called simple heat syncope.]

M. L. Thomson

MISCELLANEOUS DISEASES

Brygoo, E. Action du bacille de Whitmore sur les hématies de différentes espèces animales. [**Action of *Pf. whitmori* on Red Blood Corpuscles from Animals of Different Species**] *Ann. Inst. Pasteur.* 1952, Sept., v. 83, No. 3, 413–15.

There are few records regarding the haemolytic properties of *Malleomyces pseudomallei* [*Pf. whitmori*].

In Saigon, the author obtained 35 strains from a variety of pathological material derived from cases of human melioidosis. The strains had been isolated between two years (or less) and six years at the time of the present study. The best results were obtained on blood agar (2 per cent.) plates. After 24 hours at 37°C., the cultures were kept for 12 days at laboratory temperature (about 30°C.). When haemolysis occurred, it took the form of a colourless transparent halo, well circumscribed : there was no green change in the medium nor any change in the appearance of the colonies. Results were similar in all strains, irrespective of age or source.

There was some haemolysis in broth, but none in filtrates of broth cultures nor in saline suspension. A table shows the maximum diameters of the zone of haemolysis and the time necessary for its development in the blood cells of 9 species of animals.

Rabbit cells were the most sensitive to haemolysis and human cells the least : cells of birds were especially resistant. *H. J. O'D. Burke-Gaffney*

Jelliffe, D. B. **Rhinoscleroma in a Nigerian Male.** *West African Med. J.* 1952, July–Aug.–Sept., v. 1 (n.s.), No. 3, 122–6, 2 figs.

" The typical features of rhinoscleroma are summarised and the first case reported from West Africa is described."

Jelliffe, D. B. **Juvenile Osteomalacia in a Nigerian Child.** *J. Trop. Med. & Hyg.* 1952, Oct., v. 55, No. 10, 215–17, 4 figs.

" A case of juvenile osteomalacia occurring in a 6-year-old mentally-defective Nigerian girl is described. It is felt that the condition had resulted from the child being left permanently in a shaded room because of her inability to walk."

Lucasse, C. Le " Kitondji ". Une paralysie spastique. [**" Kitondji ". A Spastic Paralysis**] *Ann. Soc. Belge de Méd. Trop.* 1952, Aug. 31, v. 32, No. 4, 391–400, 3 figs. on 2 pls.

In the course of visiting 117 villages in the south of Kwango (province of Leopoldville, Belgian Congo) the author saw 34 persons suffering from a spastic paraplegia. The lesion appeared to be situated in the lumbar region of the spinal cord. Most of the cases arose during adolescence, but affected children aged 4 to 8 years were seen. The patients became permanent cripples. The cranial nerves and upper limbs were typically unaffected. The cause of the condition is stated to be unknown.

[The clinical descriptions and the photographs suggest strongly that the condition closely resembles or is identical with lathyrism. This possibility is not discussed by the author : no dietary studies were made.]

R. Passmore

Brown, J. H. **Tick Paralysis ; a Note on a Human Case caused by a Male Tick.** *J. Econom. Entom.* 1952, Aug., v. 45, No. 4, 737–8.

White, J. S. **" Chloromycetin " in Tropical Diseases.** *J. Roy. Egyptian Med. Ass.* 1952, v. 35, No. 8, 566–80. [17 refs.]

A general review.

PROTOZOOLOGY : GENERAL

Jacobs, L., Jones, Frances E. & Melton, Marjorie L. **The Survival of *Toxoplasma gondii* in Various Suspending Media.** *J. Parasitology.* 1952, Aug., v. 38, No. 4, Sect. 1, 293–7.

The authors describe the results of experiments to test the viability of *Toxoplasma* in different fluids which might be used for work with this parasite under laboratory conditions.

For these tests the peritoneal fluid of infected mice was suspended in saline, 10 per cent. serum-saline, and 1 per cent. neopeptone-broth. After these had stood for varying periods, the viability of the parasites was determined by their ability to infect mice after intraperitoneal inoculation of 0·5 ml. of the suspension. It was found that toxoplasms suspended in saline for 2 hours and kept at 5°C. or 20–28°C., lost their power of infection ; in suspensions with neopeptone-broth they remained fully infective after 4–5 hours, their infectivity decreasing with time up to 24 hours ; while in broth and milk they survived after 9 hours.

Experiments carried out on the viability of these parasites after storage of brains of infected mice, showed that for practical purposes the maximum period of storage at 5°C. is 7 days. On several occasions the authors have successfully sent infected tissue by air mail, the journeys taking 24–48 hours. The experimental findings are shown in detail in 3 tables. *C. A. Hoare*

Bamatter, F. Neuere Gesichtspunkte in der Toxoplasmoseforschung. [**New Aspects of Toxoplasmosis Research**] *Wien. klin. Woch.* 1952, Mar. 14, v. 64, No. 11, 185–9.

The author gives a critical review of the present state of knowledge of toxoplasmosis, based on his own experience and on the existing literature which now comprises about 800 publications, 550 of which are devoted to the

human disease, and 250 to the infection in animals, parasitology and experimental investigations. A brief account is given of the aetiology, host-parasite relations, epidemiology and clinical course of the disease, while special consideration is given to unusual manifestations and to points which require further elucidation. Thus, a case is cited of an adult (*aet.* 43) with typical symptoms of congenital toxoplasmosis (hydrocephalus, intracerebral calcifications, etc.) while in other cases of congenital disease there were no ocular lesions, and in one case only the intestine was involved. The diagnosis may be uncertain in cases showing typical clinical and histopathological signs in the absence of parasites. In this connexion attention is drawn to the existence of ophthalmo-encephalitis with cerebral calcifications of non-toxoplasmic nature. Similarly, congenital deformations of the head ("platygmicrocephaly") sometimes simulate anencephaly of toxoplasmic origin.

The author then considers various pitfalls in the serological methods of diagnosis of toxoplasmosis. Among these Sabin's neutralization test and Frenkel's toxoplasmin test are considered to be of doubtful value, while in the case of the dye test the significance of low titre reactions is not clear. Having analysed all the records of toxoplasmosis (457 cases), the author concluded that only in 75 cases has fatal congenital infection been established on parasitological grounds, while among those who survived a convincing serological diagnosis has been made in 140 cases. Among the cases which have not been confirmed by serological tests, the diagnosis of congenital toxoplasmosis can be admitted in 120 showing cerebral calcifications. As regards the ocular lesions, they are of little diagnostic value, for in 90 cases of chorioretinitis observed by Sabin the titre was not higher than that in healthy people. It is also pointed out that many clinical manifestations of unknown aetiology may simulate toxoplasmosis.

In conclusion, the author emphasizes the importance of team work in the study of toxoplasmosis, which can only be elucidated by the combined efforts of paediatricians, ophthalmologists, gynaecologists and veterinarians, aided by serologists and biologists. *C. A. Hoare*

PLAS, E. Další příspěvek k humanní toxoplasmose. [**A Further Contribution to Human Toxoplasmosis**] *Časopis Lékařů Českých.* Prague. 1952, Sept. 19, v. 91, No. 38, 1099–102.

Five cases of toxoplasmosis have been observed by the author in the ophthalmological department of the hospital in Strakonice, Czechoslovakia. (1) A boy aged 7. The left eye was smaller at birth; on examination it showed intermittent strabismus, with a sharply defined round pale yellow plaque near the macula. Vision was 5/36. An X-ray of the skull showed patches of calcification and separation of sutures. (2) A girl aged 10 years, mentally retarded. The right eye showed microphthalmos, nystagmus and strabismus, with a sharply defined pigmented plaque involving the macula, and a second near the periphery from which a fold extended to the papilla giving the appearance of ablatio retinae falciformis. A plaque was also seen in the left eye; X-rays of the skull showed calcifications. (3) A woman aged 20. The right eye showed a pigmented plaque near the macula surmounted by a cyst. Vision was 5/15. (4) A girl aged 8. The left eye showed a pigmented plaque near the macula. In these 4 cases the dye test gave positive results with the serum of the patients and their mothers, and the condition was evidently congenital. (5) A man aged 33, complaining of misty vision and pains in the neck. Visual acuity was good (5/7), in spite of a sectorial scotoma, and a diagnosis of retinochoroiditis juxtapapillaris was considered. The Mantoux reaction was

positive in a dilution of 1/1,000,000, and appearances suggestive of a tuberculous infection were seen in X-rays of the lungs. The dye test was positive. A test dose of old tuberculin given intradermally produced a marked local reaction and an intensification of the eye condition ; this was diagnosed as solitary tubercle of the choroid, and improved after treatment with streptomycin and PAS. The toxoplasma infection in this case was symptomless.

D. J. Bauer

Kass, E. H., Andrus, S. B., Adams, R. D., Turner, F. C. & Feldman, H. A. **Toxoplasmosis in the Human Adult.** *Arch. Intern. Med.* 1952, May, v. 89, No. 5, 759–82, 6 figs. [Refs. in footnotes.]

Most of the cases of toxoplasmosis so far reported have been in infants ; in these the infection has apparently been acquired *in utero* though the mother has been free from symptoms and the signs and symptoms have been encephalopathy, usually with hydrocephalus or microcephaly, intracerebral calcification, chorioretinitis and microphthalmos. Far fewer adults have been observed with toxoplasmosis ; in most of those described the main signs and symptoms have been different from those in infants and have been mainly acute encephalitis, pneumonitis and myocarditis, and a maculopapular rash.

Laboratory infections in adults have occurred ; in one the course was acute and rapidly fatal but in another it was almost asymptomatic after a brief febrile onset with adenopathy. This apparent rarity of the clinical disease in human adults is in contrast with the extreme frequency of the infection in wild and domestic animals and birds. However, antibody and dermal tests in man suggest that the *infection* in man is far more frequent than the *disease* and that it increases in frequency with increasing age.

The authors report a case of toxoplasmosis in an adult, a 60-year-old white woman. She had been ill only 12 days and she died after 2 months in hospital. Her symptoms on admission were pains in the back, knees and hip and a generalized rash. She had a high intermittent temperature, rising to 104°F. ; this subsided after about 10 days but subsequently she had an irregular pyrexia of a lower order. The case was " particularly noteworthy because of the following features : 1. The diagnosis was suggested by the histologic examination of a muscle biopsy specimen. 2. Toxoplasma organisms were isolated from a muscle biopsy specimen. 3. The diagnosis was made in sufficient time to institute intensive therapy with several agents that have proved effective in experimental animals. 4. Serial antibody determinations indicate that this was a recently acquired infection. 5. A complete postmortem examination was done with the demonstration of disseminated polymyositis and meningoencephalomyelitis. 6. The organisms were isolated from many organs."

[The case is very fully described and the paper includes a number of excellent histopathological illustrations.] *L. E. Napier*

Hertzberg, R. **Toxoplasmosis : a Review with a Report of Three Cases.** *Med. J. Australia.* 1952, July 12, v. 2, No. 2, 45–8, 1 fig. [25 refs.]

After a brief review of the literature on toxoplasmosis, and a more detailed account of its manifestations, diagnosis, and treatment culled from this literature, the author records the history and findings in 3 cases of the condition seen in hospitals in Sydney, Australia. The first was a girl, first seen when 4 months old and now aged 7 years, the second a boy first seen when 3 weeks old who died when 9 weeks of age, and the third a girl seen when 7 weeks old who died when 14 weeks of age. A post-mortem examination was done on the second patient.

In all these cases the diagnosis was substantiated by serological examinations of the patients and of their mothers. [The full and informative details should be sought in the original.]

The author is of the opinion that toxoplasmosis is more prevalent than has hitherto been suspected. *A. R. D. Adams*

RIEGER, H. Augentoxoplasmose und Hepatitis epidemica. [**Ocular Toxoplasmosis and Epidemic Hepatitis**] *Deut. med. Woch.* 1952, Oct. 10, v. 77, No. 41, 1250–53. [24 refs.]

This paper consists mainly in an account of a number of cases in which ocular toxoplasmosis or latent toxoplasmosis either preceded or followed attacks or relapses of hepatitis. From this clinical experience and the consideration of some of the epidemiological aspects, it is suggested as a possibility that attack by either of these infections may lessen individual resistance to the other disease. The author advocates a planned examination of all toxoplasmosis cases for liver damage and of hepatitis cases by the Sabin Feldman toxoplasmosis test. *M. E. Delafield*

EYLES, D. E. & COLEMAN, Nell. **Tests of 2, 4-Diaminopyrimidines on Toxoplasmosis.** *Pub. Health Rep.* Wash. 1952, Mar., v. 67, No. 3, 249–52, 1 chart.

The substance 2 : 4-diamino-5-(*p*-chlorphenyl)-6-ethyl pyrimidine, better known as Daraprim, which possesses marked anti-malarial activity, has now been tested for activity, along with three other members of the series and sulphadiazine, against *Toxoplasma gondii* in mice. Animals about 20 gm. in weight were inoculated intraperitoneally with 20,000 organisms obtained from peritoneal exudate of infected hosts. In untreated mice death resulted in approximately 7 days. The drug was administered in diet for a period of 14 days starting just after inoculation. A therapeutic effect was indicated by prolongation of the life of the infected animal. Cures were obtained only infrequently. It was found that Daraprim and the corresponding n-amyl derivative possessed activity just a little less than sulphadiazine but it was not such as to suggest that these compounds would be of value in the treatment of the human disease. *J. D. Fulton*

SOYKA, O. & JÍROVEC, O. Nález vzácného parasita rodu Sergentella v lidské krvi. [**Finding of a Rare Parasite of the *Sergentella* Group in Human Blood**] *Časopis Lékařů Českých.* Prague. 1952, Oct. 17, v. 91, No. 42, 1202–3, 1 fig.

The English summary appended to the paper is as follows :—

"During an incidental investigation of reticulocytes stained with brilliant cresyl blue, the authors discovered a parasite of the Sergentella group. It differs from the Sergentella hominis Brumpt 1910 in its length and mucous coating. By reporting it they wish to draw the attention of other haematological laboratories to the fact that these rare parasites may occur in our regions too."

ENTOMOLOGY AND INSECTICIDES : GENERAL

[Papers on the toxic effects of insecticides in man are abstracted in the *Bulletin of Hygiene* under the general heading of Occupational Hygiene and Toxicology.]

Rachou, R. G. & Ferraz, D. M. Contribuição ao conhecimento da distribuição geográfica dos anofelinos no Brasil : Estado de Santa Catarina. [**Geographical Distribution of Anophelines in the State of Santa Catarina, Brazil**] *Rev. Brasileira Malariologia.* Rio de Janeiro. 1951, Oct., v. 3, No. 4, 540–54, 4 maps. [13 refs.]

The English summary appended to the paper is as follows :—

" The authors present the distribution of 23 species of anophelines, identified until 31–12–1950, by 38 counties and 155 localities of Santa Catarina State (Brazil)."

Hull, W. B. **Mosquito Survey of Guam.** *U.S. Armed Forces Med. J.* 1952, Sept., v. 3, No. 9, 1287–95.

Mosquito surveys on the island of Guam during 1944 and 1945 revealed that the following mosquitoes were present : *Aëdes aegypti, Aëdes albopictus, Aëdes pandani, Aëdes guamensis, Aëdes vexans nocturnus, Aëdes oakleyi, Culex quinquefasciatus* [*fatigans*], *C. annulirostris marianae, C. litoralis* and *C. sitiens.*

Control measures against *Aëdes aegypti* were started in 1945 and by mid-summer this mosquito was said to be very rare and later to be eradicated from certain localities.

Other surveys between 1948 and 1951 confirmed the complete absence of *Aëdes aegypti* and reported that *Aëdes albopictus* had replaced it. *Anopheles subpictus indefinitus* was first recorded in 1948 and is supposed to have been introduced from the Philippines though there is no proof of this. No autochthonous malaria is known in Guam and this anopheline is not regarded as a vector.

The mosquito breeding places are briefly noted and the collections are analysed in three tables. *H. S. Leeson*

Manefield, T. **Investigations of the Preferences shown by** *Aëdes* (*Stegomyia*) *aegypti* **Linn. and** *Culex* (*Culex*) *fatigans* **Wied. for Specific Types of Breeding Water.** *Proc. Linnean Soc. of New South Wales.* 1951, v. 76, Pts. 3/4, 149–54. [11 refs.] [Summary taken from *Rev. Applied Entom.* Ser. B. 1952, Aug., v. 40, Pt. 8, 132–3.]

Experiments on the reactions of *Aëdes aegypti* (L.) and *Culex pipiens* var. *fatigans* Wied. to tap water (0·0062 per cent. dissolved salts) and foul water for oviposition and the ability of larvae to develop to the mature pupal stage when kept in these types of water and given food are described. A laboratory stock of *A. aegypti* and a stock of *C. p. fatigans* collected at Sydney were used. The foul media were infusions prepared by mixing approximately equal parts by volume of dried horse manure and water and allowing the mixtures to stand for seven, 10–11 or 14–15 days. When given the choice between tap water and infusions that had matured for ten days or more, females of *A. aegypti* laid 82·3 per cent. of 29,905 eggs in the foul water, and those of *C. p. fatigans* laid many eggs on the foul water and none on the tap water. The percentages of individuals of *A. aegypti* that developed in seven-day infusions were 70, 38 and 0 when larvae were introduced in the third, second and first instars, respectively.

and 4 when introduction was in the egg stage. The corresponding percentages were 88, 74, 58 and 44 for ten-day infusions, 98, 98, 94 and 94 for 14-day infusions, and 99, 99, 96 and 99 for tap-water controls. Scum formation affected survival in the seven- and ten-day infusions, and mortality was reduced in all cases by removing the scum. Its effect was most noticeable when eggs or first-instar larvae were introduced into ten-day infusions. The percentages surviving in these two cases increased to 90 and 82, respectively, when the scum was removed. For comparison between the two mosquitos, larvae were introduced into the medium in the first instar. The survival percentages for *A. aegypti* and *C. p. fatigans* were 3 and 62 in seven-day infusions with the scum untouched, 5 and 74 in similar infusions with the scum removed, 60 and 92 in 11-day infusions with the scum untouched and 84 and 96 in 11-day infusions with the scum removed.

HOCKING, B. **Autolysis of Flight Muscles in a Mosquito.** [Correspondence.] *Nature.* 1952, June 28, v. 169, 1101.

Working at Churchill, Manitoba, which is on the southern shore of Hudson Bay, the author has always failed to capture gravid females of *Aëdes communis* (or a very closely related undescribed species). He now finds that in the month of July the muscles of flight in the female undergo autolysis, which renders the insect flightless. As the muscles break down the eggs undergo development, and in specimens in which the eggs are almost ready to be laid the thorax appears to be almost devoid of solid structures, no trace of the main flight muscles being detected. It seems that this particular mosquito seldom or never takes a meal of blood ; the flight muscles are used up as a source of nitrogen for the production of new material in the developing eggs. *P. A. Buxton*

WEST, A. S. & ELIGH, G. S. **The Rate of Digestion of Blood in Mosquitoes. Precipitin Test Studies.** *Canadian J. Zool.* 1952, Oct., v. 30, No. 5, 267–72. [13 refs.]

The authors wish to estimate the length of time which passes before blood meals in mosquitoes cease to be identifiable by precipitin tests.

In the laboratory *Aëdes aegypti* was fed on man and then given no further blood meals, the insects being kept at different steady temperatures. It was found that at 27°C. the blood could always be identified after one day but not after 2 ; at 15° it could be identified after 2 days but not 3 ; at 11° and 6° it could be identified as long as the mosquitoes lived, 8 and 4 days respectively. The results were regular, for every mosquito tested would be positive on one day, but on the next day all or nearly all would be negative.

Work was carried out with wild *Aëdes* on the south shore of Hudson Bay : the great majority of the specimens were *Aëdes hexodontus*. After feeding on man the insects were kept in cages at the prevailing temperature, the maximum and minimum of which are quoted. The results were less regular owing to day-to-day changes in the temperature : but when the maximum and minimum were approximately 60 and 40°F. the precipitin tests were positive in all, or nearly all, cases for some 7 days.

[It is a curious convention to quote temperatures in the laboratory in °C. and in the field in °F.] *P. A. Buxton*

KEENER, G. G., Jr. **Observations on Overwintering of *Culex tarsalis* Coquillett (Diptera, Culicidae) in Western Nebraska.** *Mosquito News.* 1952, Sept., v. 12, No. 3, 205–9, 3 figs.

" Evidence is presented to show that hibernating *C. tarsalis* adult females may be collected in food storage cellars throughout the winter months in

western Nebraska. The temperature within these cellars where specimens were regularly found did not go below 33°F. *C. tarsalis* evidently remains in hibernation until outdoor daily minimum air temperatures are maintained above freezing.

" Hibernating *C. apicalis* females were also collected on several occasions along with *C. tarsalis*."

Bishopp, F. C. **Mosquito Control moves Forward.** *Mosquito News.* 1952, Sept., v. 12, No. 3, 135–41. [18 refs.]

An interesting and comprehensive review of the many anti-malaria and other mosquito control programmes which have been undertaken in different parts of the world in recent years.

Hill, Rolla B. **Some Aspects of Mosquito Control Activities in South America.** *Mosquito News.* 1952, Sept., v. 12, No. 3, 153–6.

Hu, S. M. K. **Mosquito Control in the South Pacific.** *Mosquito News.* 1952, Sept., v. 12, No. 3, 164–6.

Smith, A. G. & Harrison, R. A. **Notes on Laboratory Breeding of the Housefly (*Musca domestica* L.).** *New Zealand J. Sci. Tech.* 1951, v. 33 (B), No. 1, 1–4, 1 fig. [Summary taken from *Rev. Applied Entom.* Ser. B. 1952, Sept., v. 40, Pt. 9, 138.]

In the modifications here described of a method used in New Zealand for rearing *Musca domestica* L., hessian moistened with the food used for the adults and folded longitudinally in the tube is substituted for cotton-wool as the oviposition medium. The flies in the breeding cage have uninterrupted access to a feeding tube and the oviposition tube serves solely to collect the eggs. Enough eggs of uniform age to start four cultures can be obtained in this way in 3–6 hours from a cage containing about 800 flies, and the eggs are more readily collected than from cotton-wool. The second modification is the substitution of sawdust for cotton-wool in the pupation dish, as the larvae sometimes pupated in the cotton-wool instead of beneath it, and separation was difficult.

The new method enabled over 90 per cent. of the pupae to be recovered from the petri dish, and only these were used. Observations are recorded on the life-histories of flies of the DDT-resistant line G and the susceptible line A when reared by this method ; the percentages of females obtained were about 38·4 in line A and 29 in line G, and the peak of emergence was somewhat later in line G. An increase in the number of eggs seeded resulted in smaller pupae and a prolongation of the life-cycle.

Harrison, R. A. **Further Studies on DDT-Resistant Houseflies in New Zealand.** *New Zealand J. Sci. Tech.* 1951, v. 33 (B), No. 2, 92–5. [Summary taken from *Rev. Applied Entom.* Ser. B. 1952, Sept., v. 40, Pt. 9, 149.]

The DDT-resistant line G of *Musca domestica* L. bred in the laboratory without further exposure to DDT was still resistant in the 19th generation. In one of two series of tests in which females were exposed for five minutes, deposits of 100–3,200 mg. per sq. ft. killed 3 per cent. or less ; in the other, deposits of 25, 50 and 100 mg. all gave 4 per cent. kill. To obtain kills of these flies similar to those of a non-resistant line with deposits of 6·25–100 mg., exposure had to be 18 times as long. Three exposures of the same individuals at 24-hour intervals had a cumulative effect and produced mortalities similar to those likely to have been obtained if the three exposures had been continuous. A line of flies was

bred from line G through 17 generations by exposing flies of each generation to DDT deposits and rearing the succeeding generation from the survivors. Exposure to DDT did not impair the egg-laying capacity of the females and there was no indication of delayed lethal effects.

HARRISON, R. A. **A Note on the Toxicity to Houseflies of DDT Residues.** *New Zealand J. Sci. Tech.* 1951, v. 33 (B), No. 2, 96–8. [Summary taken from *Rev. Applied Entom.* Ser. B. 1952, Sept., v. 40, Pt. 9, 149.]

The results are given of an investigation on the duration of effectiveness against *Musca domestica* L. of DDT films on plain plywood or plywood treated five or 113 days before with oil paint or 81–82 days before with water paint, oil-bound water paint, or synthetic enamel. The films were formed by spraying panels with 5 per cent. solutions of pure p,p'DDT in kerosene to leave deposits of 800 mg. per sq. ft. on unpainted wood and 200 mg. per sq. ft. on painted surfaces, and the panels were joined to form cages in which the flies were confined for an hour. Knockdown was recorded at the end of exposure and mortality 24 hours later. Deposits on the fresh oil paint were not toxic at any time. The rates of mortality were 100 and over 80 per cent. on enamel after 324 and 1,353 days, oil-bound water paint after 324 and 1,316 days, water paint after 387 and 909 days and the old oil paint after 261 and 324 days, and they were 100 and 97·7 per cent. on untreated wood after 198 and 1,399 days. All deposits were only slightly toxic to flies of a DDT-resistant strain.

SACKTOR, B. **Some Aspects of Respiratory Metabolism during Metamorphosis of Normal and DDT-Resistant House Flies,** *Musca domestica* **L.** *Biol. Bull.* 1951, v. 100, No. 3, 229–43, 5 graphs. [54 refs.]

PETERSON, D. G. **Observations on the Biology and Control of Pest Trichoptera at Fort Erie, Ontario.** Reprinted from *Canadian Entomologist.* 1952, Apr., v. 84, No. 4, 103–7, 1 fig.

Along the St. Lawrence River, which forms a part of the frontier between the U.S.A. and Canada, adult caddis flies (Trichoptera) and to some extent mayflies (Ephemerida) are so numerous as to be a disagreeable pest. References are given to papers in the medical press showing that the caddis flies are an exciting cause of allergic conditions such as asthma and coryza. Unfortunately the insects are called " sand flies ", and the disease " sandfly fever ".

The caddis flies become extremely numerous in the middle of June and continue until the late autumn. The author describes an immense increase in their numbers in the latter part of August. Dense swarms of the insects form over trees a few hours before sunset. The swarms then unite to move as a mass up-stream blanketing the river bank to a distance of about 1,000 yards from the water. The author collected about 6,800 specimens with 10 sweeps of a net. Tremendous numbers of these insects collect about lights in the streets and in houses, and piles of dead insects may be found beneath street lamps in the morning. Owing to the numbers of these insects the outsides of houses cannot be painted during the summer, cars have to be driven as they would in a dense fog, some people suffer from the allergic reaction, and the masses of dead insects produce a stench.

The majority of the caddises are *Hydropsyche* spp. but representatives of a considerable number of other species, and indeed genera, are prevalent. The breeding takes place in rapidly running water and particularly from 6 to 10 feet below the surface on a ridge of rocks and gravel. A map defines some of the main breeding places and areas of heavy infestation along the Niagara River where it leaves Lake Erie.

One is happy to note that the author feels that more information is required, not only on the caddises themselves but on the whole balance of life in the river. Until we are better informed he doubts whether the large-scale application of an insecticide to the river is advisable. At least for the moment it would seem wiser to attempt to destroy the majority of the adult insects by the use of DDT fog applied from a thermal generator, such as the apparatus known as the Tifa, which has given promising results. *P. A. Buxton*

YASUMATSU, K. **Rearing of Flea Larvae on various Diets.** *J. Fac. Agric. Kyushu Univ.* 1949, v. 9, No. 2, 121–6. [13 refs.] [Summary taken from *Rev. Applied Entom.* Ser. B. 1952, Aug., v. 40, Pt. 8, 122.]

The media that have been used by various workers to rear flea larvae are briefly reviewed from the literature, and an account is given of experiments in Japan on the development of larvae of *Xenopsylla* (*Ceratophyllus*) *cheopis* (Roths.) on nine single media and 23 mixtures containing them. The larvae were introduced when 0–24 hours old into bottles containing sawdust and the substance to be tested. Of larvae reared on dried and powdered rat excrement and on floor dust collected under straw mats, 95 and 92 per cent., respectively, reached the adult stage. The next highest percentage emergence on a single medium (36·7) was obtained with a mixed cereal and bean flour. The only other single media that allowed of any emergence were dried and powdered ox-blood and silkworm pupae. A mixture of the flour and ox-blood and one of the pupae and rat excrement allowed of 96·9 and 90 per cent. emergence, respectively, but with about one-third of the mixtures, including one containing flour and ox-liver and some containing rat excrement, ox-blood or both, there was no emergence at all. The duration of the combined larval and pupal stages was shortest on the dust from beneath straw mats.

OLENEV, N. O. [**On the Effect of the Toxic Principles of Higher Plants on Ixodid Ticks**] *Dokl. Akad. Nauk SSSR* (N.S.). Moscow. 1950, v. 71, No. 6, 1119–20. [In Russian.] [Summary taken from *Rev. Applied Entom.* Ser. B. 1952, Aug., v. 40, Pt. 8, 121.]

Since the patchiness of the distribution of Ixodid ticks in forest and other habitats in the Soviet Union might be the result of a repellent or toxic action on them of certain plants, tests were carried out in which unfed larvae of *Ixodes ricinus* (L.) were exposed to the vapours from various pulped plant parts. They were confined in covered petri dishes or test-tubes at a short distance from the plant material, and the results showed that they were killed in 15 minutes or less by the winter buds or bark from the branches of *Prunus padus* or the leaves of *P. laurocerasus*, killed in 17 and 25 minutes by lemon rind and garlic bulb, immobilised in 10–15 minutes and killed in 2–4 hours by leaves of *Thuja occidentalis*, and killed in several days by onion bulb. When placed in the juice of lemon rind or onion, they died in 7–10 and 40 minutes, respectively.

In subsidiary tests with pulped leaves of *P. laurocerasus*, adults and nymphs of *Argas persicus* (Oken) ceased to move in ten minutes and died in 2–48 hours, and adults of *Pulex irritans* L. and *Cimex lectularius* L. died in three and five minutes, respectively. Adults of *Drosophila funebris* (F.) were killed in 50–90 seconds by leaves of *P. laurocerasus* and in 20–25 minutes by orange rind.

OLENEV, N. O. [**New Data on the Effect of Poisons from Higher Plants on Ticks and Insects**] *Dokl. Akad. Nauk SSSR* (N.S.). Moscow. 1950, v. 75, No. 1, 149–51. [In Russian.] [Summary taken from *Rev. Applied Entom.* Ser. B. 1952, Aug., v. 40, Pt. 8, 136.]

An account is given of further tests in the Soviet Union on the toxicity to ticks and insects of the volatile fractions from various plants. The plant parts were

collected in winter (February or early March) or spring (May or early June), finely ground, and used at the rate of 1 gm. to 60 cc. space. The technique was the same, except that mosquito larvae and pupae were in water in watch-glasses in the petri dishes. In the winter tests, buds of *Prunus padus* (*Padus racemosa*) killed larvae of *Ixodes persulcatus* Schulze, *Dermacentor pictus* (Herm.) and *Hyalomma asiaticum* Schulze & Schlottke in 10–12 minutes, and the bark killed adults of *Musca domestica* L. and *Cimex lectularius* L. in 1 and 3–5 minutes, larvae of *H. asiaticum* and *D. pictus* and nymphs of *I. ricinus* (L.) in 10–15 minutes, and adult females of *I. ricinus* in 25–30 minutes. The leaves of *Prunus laurocerasus* (*Laurocerasus officinalis*) and *Thuja occidentalis* killed adults of *M. domestica* in 1 and 120 minutes respectively.

In the spring tests, the leaves of *P. padus* killed larvae and male and female adults of *I. ricinus* in 7–10, 10–15 and 25–30 minutes, respectively, and adults of *Anopheles maculipennis* Mg. and *Drosophila funebris* (F.) in 1 minute, the bark killed larvae and pupae of *A. maculipennis* in 10–15 minutes and adults of *Aëdes punctor* (Kby.) in 1 minute, and the flowers killed adult males and females of *I. ricinus* in 10–15 and 25–30 minutes, respectively. The flowers of *P.* (*Padus*) *maackii* killed adults of *A. punctor* and *C. lectularius* in 1 and 3 minutes and adult males and females of *I. ricinus* in 7–10 and 25–30 minutes, and the bark killed adults of *A. punctor* in 1 minute. Leaves of *P. laurocerasus* killed males and females of *I. ricinus* in 10–15 and 20 minutes, adults of *M. domestica* and *Anopheles maculipennis* in 1 minute and pupae of *A. maculipennis* in 10 minutes. Leaves of *Eucalyptus botryoides* and *E. paniculata* killed adults of *Aëdes punctor* in 20 minutes.

Similar tests with *Abies sibirica*, *Pinus sylvestris*, *Betula verrucosa*, *Caragana arborescens*, *Ribes nigrum*, *Acer platanoides* and *Daphne mezereum* were negative.

Public Health Rep. Wash. 1952, May, v. 67, No. 5, 455–8. **Insecticides and Rodenticides—1952 Recommendations for Use.**

This paper, prepared by the technical department branch of the U.S. Communicable Disease Centre, mainly gives recommendations for the formulation of insecticides in combating insects which are liable to exhibit resistance, such as mosquitoes and flies, and a small section is devoted to a review of rodenticides.

During the last year there have been indications that some species of *Anopheles* are developing resistance to DDT. *Anopheles quadrimaculatus* is one but the resistance developed does not significantly effect control operations. Thus 5 per cent. DDT emulsion residual sprays in homes is recommended to control adult mosquitoes, and the use of 0·05 lb. of DDT in 1 gallon of fuel oil per acre to control the larvae, while a 5 per cent. DDT emulsion or oil solution is advised for outdoor space spraying. *Culex tarsalis*, the only known mosquito vector of disease that appears resistant to insecticides to a high degree, has become resistant in varying degrees to DDT, toxaphene, lindane, aldrin and heptachlor, and the authors recommend combinations of DDT with DMC (dichlorodiphenyl methyl carbinol) as a space spray. In the case of salt marsh mosquitoes which are resistant to DDT and other insecticides in certain areas, lindane applied in oil solutions from aircraft at 0·1 lb. per acre is advisable. If this fails then DDT-DMC combinations must be tried. Where resistance is not a factor, DDT remains the insecticide of choice. Residual spraying with 1 per cent. DDT emulsions to the outside of individual premises, together with vegetation for 100 feet around, has given satisfactory control of salt-marsh mosquitoes for 3 weeks where DDT resistance has not developed. Residual larviciding with 1 lb. per acre of technical BHC gives control in small, fresh water ponds for 5–8 weeks. Repeated treatment over 3 years did not damage fish. Effective

control for 3–6 months is obtained with DDT emulsion at the rate of 3 lb. per acre ; this, however, destroys all fish life. Dieldrin emulsion at 1 lb. per acre is equally effective but destroys other aquatic life and should be used only as a last resort.

Little advance has been made in the last year in combating house-flies resistant to DDT and other chlorinated insecticides. Residual sprays containing 2·5–5 per cent. dilan in suspension are effective against DDT-resistant flies but laboratory studies indicate that resistance may develop fairly quickly. Where the flies are not resistant DDT at a dosage of 200 mgm. per sq. ft. applied in a 5 per cent. emulsion or suspension is recommended indoors, and for outdoor treatment the addition of 2 per cent. pure gum rosin increases effectiveness. Dieldrin applied as a 0·625 per cent. emulsion can be used outdoors, and chlordan is advised in positions protected from the weather at a dosage of 5 per cent., though sprays for dwelling houses should contain no more than 2·5 per cent. The residual sprays can be used as larvicides but liability to induce resistance still occurs. Space sprays used against night resting places can be effective against resistant flies. A 5 per cent. DDT emulsion combined with DMC in the ratios of 5 : 1 to 20 : 1 is effective, as is a 2·5 per cent. emulsion of dilan at a dosage of 0·05 lb. per acre. Pyrethrum formulations in combination with synergists such as piperonyl butoxide in emulsions or oil solutions containing 0·05 to 0·1 per cent. pyrethrins and 0·5 to 1·0 per cent. synergist are still used. Five per cent. technical BHC or 2·5 per cent. chlordan emulsions are effective as outdoor sprays where the flies are still susceptible to these compounds. It is greatly emphasized that insecticides are more than ever a supplement to sanitation rather than a substitute for it.

For oriental rat flea control, a 5 per cent. DDT dust is effective when applied to rat runs, and a 10 per cent. chlordan dust is recommended for controlling soil infestations of cat and dog fleas. Roaches can be controlled by spot spraying of 2 per cent. chlordan emulsion or oil solution.

In dealing with rodenticides, warfarin is the first effective slow-acting rodenticide for it fails to induce bait shyness and has a relatively small hazard to man and useful animals. *Rattus rattus* requires 0·025 per cent. of warfarin in the bait, while *Rattus norvegicus* and mice need only 0·005 per cent. For initial control a minimum of 2 weeks' baiting is necessary, while for permanent control baits need attention every 6 weeks. ANTU is a quick acting poison but causes bait shyness if used regularly. Therefore warfarin is recommended to achieve lasting control after the initial reduction of large numbers by ANTU. Sodium monofluoracetate (1080) is still the most effective quick acting rodenticide, but its extreme toxicity to man and animals limits its use to special circumstances. It is stressed that rodenticides should only be used as an auxiliary to proper sanitation. *Thomas E. Fletcher*

HADAWAY, A. B. & BARLOW, F. **Studies on Aqueous Suspensions of Insecticides. Part III. Factors affecting the Persistence of some Synthetic Insecticides.** *Bull. Entom. Res.* 1952, July, v. 43, Pt. 2, 281–311, 9 figs. on 3 pls. [20 refs.]

In this paper work is recorded on the persistence of DDT, gamma BHC, aldrin and dieldrin crystals of different initial sizes, applied in aqueous suspension to different types of materials. Surfaces were sprayed with an insecticide dosage of 25 mgm. per sq. ft. exposed after varying times to adult female mosquitoes (*Aëdes aegypti*) for different durations of time, the insects were transferred to recovery cages and mortality counts were taken after 24 hours.

There is an inverse relationship between particle size and initial contact toxicity. The influence of particle size on effectiveness decreases as the intrinsic

toxicity of the insecticide increases. Thus all size ranges 0–10, 10–20, 20–40, 40–60 and 60–80 μ of gamma BHC gave 100 per cent. kills after only 15 seconds' contact, whereas DDT particles of 0–10 and 20–40 μ gave kills of 63 and 0 per cent. respectively. The order of immediate contact toxicity to mosquitoes is dieldrin $\geq$ gamma BHC > aldrin > DDT. Similarly there is an initial inverse relationship between particle size and fumigant effect because of the increase in surface area with decrease in particle size. The 4 compounds can be arranged in the order gamma BHC > aldrin > dieldrin > DDT for fumigant effect, and exhibit no repellent effect if direct contact is avoided.

The larger the particle the longer it persists. For any given particle size the compounds can be arranged in the order of persistence : DDT > dieldrin > gamma BHC > aldrin. However, the persistence is influenced considerably by the type of material on which they are sprayed. Most striking results were obtained on mud blocks made from red earths or lateritic soils used in the construction of houses in the tropics. Particles of the 4 insecticides rapidly disappear from the surface. Even DDT particles in the 10–20 μ range disappear by the end of 7 days, and in the case of aldrin a similar result is obtained in a few hours. When surface deposits are no longer visible toxicity is completely lost on blocks treated with DDT and dieldrin but persists at a reduced level for many weeks on those treated with gamma BHC and aldrin. The experiments show that the length of time during which solid material of the 4 insecticides remains is approximately proportional to the vapour pressure under identical conditions of particle size and availability.

Particles of all insecticides remain for a much longer period on plaster blocks and wallboards than on mud blocks. For example, 10–20 μ gamma BHC particles remained on the surface of plaster blocks for 4 to 5 days, though on mud blocks they disappeared after a few hours. These surfaces are still toxic after the disappearance of aldrin and gamma BHC crystals but this toxicity is lost more rapidly than it is on mud blocks, for in 4 weeks similarly treated mud blocks are the more toxic. With 10–20 μ dieldrin crystals plaster blocks are still toxic 4 weeks after spraying while mud blocks are non-toxic within 3 days. In the case of DDT, plaster blocks are still toxic after 8 weeks as compared with 1 week on mud.

All insecticides were less effective on glass plates than on mud or plaster blocks. The wetting-agent solution remains with the insecticide particles on non-porous plates and on drying causes them to adhere strongly to the surface so that they cannot be picked up so readily as from a porous material. Thus kills after 16 minutes' contact with DDT particles on glass were similar to those after 0·5 minute on plaster. Particles of both gamma BHC and aldrin persist for a longer time on glass plates than on mud blocks but as soon as they disappear from the surface, toxicity is lost completely. On glass there is no loss by sorption and the wetting-agent solids probably retard evaporation.

Commercial formulations behaved on different materials in the same way as the pure crystals. When the high dosage of 400 mgm. DDT /sq. ft. with a mean particle size of 24 μ was applied, superimposition and aggregation of particles occurred causing greater persistence of the deposit. The surface of a mud block, however, treated in this way becomes relatively ineffective after 8 weeks.

Chemical tests showed that the whole of the dosage of 10–20 μ crystals of DDT and gamma BHC can be recovered from the interior of the block. Even with dosages up to 275 mgm. /sq. ft. the sorbed insecticide was in the top 0·2 cm. and there was no sign of the outer layer of the mud being saturated. It was found that the presence of a lime layer on the mud delayed the sorption of DDT, but that the presence of inert diluent in wettable powders had only a slight effect on the rate of loss from the surface. The sorbed DDT or dieldrin was not readily available for pick-up, this being shown when mud blocks, from the

surface of which the crystals had disappeared, were scraped and tested. However, sorbed gamma-BHC was still toxic—this was no doubt due to the fumigant effect, for ample evidence is given to show that the residual toxicity of blocks treated with aldrin or gamma BHC is due to the fumigant effect from the material inside the block. The effect of humidity on the rate of sorption was investigated and it was found that the rate of disappearance of particles from the surface of mud blocks decreases as the relative humidity (R.H.) increases. This may be due to competition between water vapour and insecticide vapour for the initial surface of the pores of the mud. In blocks kept under anhydrous conditions sorbed DDT was decomposed to DDE but this did not occur in blocks kept at 10 or 20 per cent. R.H.

The practical importance of these results in controlling mosquitoes is discussed at length. The persistence of an insecticide can be increased by increasing the particle size but this means loss in effectiveness against mosquitoes. Thus there is no advantage gained by spraying with particles of DDT larger than 40 μ. On the other hand, when using a volatile insecticide such as BHC or aldrin, which has a fumigant action after disappearance of the surface deposit, it is best to apply small particles to obtain maximum initial and ultimate residual effect. The authors suggest, in the treatment of mud walls with aqueous suspensions, that the best residual effect against mosquitoes will be obtained with an insecticide which has marked fumigant properties such as gamma BHC, for the desorption process takes several months for completion, compared with a few hours for the reverse process. *Thomas E. Fletcher*

HADAWAY, A. B. & BARLOW, F. **Inactivation of DDT by Soils.** [Correspondence.] *Nature.* 1952, Nov. 1, v. 170, 762.

Hadaway and Barlow comment on the letter by MAES [this *Bulletin*, 1952, v. 49, 1163] ; they think that the prolongation of action of DDT on mud walls by pre-spraying with phosphate solutions is not related to inhibition of decomposition of DDT, and point out that they have shown that loss of effectiveness of surface deposits is due to sorption of the DDT (or other insecticide). There is a correlation between the iron oxide content of soils and the life of DDT residues on those soils, which suggests that the iron oxide provides the active sorbing surface ; phosphate may react with this surface to reduce its activity, and reaction with ferric ions in the soil will produce gelatinous iron phosphates which may block the capillaries in the mud and retard diffusion of the insecticide vapours. *Charles Wilcocks*

FALES, J. H., BODENSTEIN, O. F. & PIQUETT, P. G. **Effectiveness of Allethrin and Pyrethrins as Sprays against Three Species of Mosquitoes.** *J. Econom. Entom.* 1952, Aug., v. 45, No. 4, 743–4.

The authors briefly review earlier work on the evaluation of allethrin as an insecticide. Fales *et al.* [this *Bulletin*, 1951, v. 48, 1158] showed that in kerosene-base sprays at low concentrations against adults of *Anopheles quadrimaculatus*, allethrin was more effective than pyrethrins in knockdown but less so in kill. With increased dosage satisfactory kills were obtained against this species and *Aëdes aegypti*. NAGASAWA *et al.* (*Botyu-Kogaku*, 1951, v. 16, 176) found that allethrin in an incense was 1½ times as effective as pyrethrins in knockdown against adult *Culex pipiens* var. *pallens*.

Aëdes aegypti, *Anopheles quadrimaculatus* and *Culex pipiens* adults were tested against both allethrin and pyrethrin with kerosene sprays in a Peet-Grady chamber. With *Aëdes* females it was found that the lethal concentration [LC–50] of allethrin was 8 times that of pyrethrins, with *Anopheles* twice and

with *Culex* approximately 5½ times. In the case of the male, the LC–50 for allethrin was 8 times that of pyrethrin for *Aëdes*, and approximately equal for *Anopheles*. As found by other workers the 3 species of mosquitoes were susceptible to insecticides to different degrees, *Culex* being the least and *Aëdes* the most susceptible, with *Anopheles* intermediate between the two.

Thomas E. Fletcher

SARLES, M. P. & VANDEGRIFT, W. B. **Chronic Oral Toxicity and Related Studies on Animals with the Insecticide and Pyrethrum Synergist, Piperonyl Butoxide.** *Amer. J. Trop. Med. & Hyg.* 1952, Sept., v. 1, No. 5, 862–83, 1 fig.

LABORATORY PROCEDURES

SERGENT, Ed. De décèlement des infections latentes. [**On the Detection of Latent Infections**] *Arch. Inst. Pasteur d'Algérie.* 1952, June, v. 30, No. 2, 123–6.

The following procedures may be employed for the detection of latent infections :

1. Blood culture. It is to be noted that occasionally a large inoculum will result in a negative culture, while a single drop will give a positive.
2. Stool culture.
3. Xenodiagnosis. The method is useful not only for the detection and diagnosis of infections, but for the separation of mixed parasites, for the identification of species of invertebrate hosts, etc.
4. Isodiagnosis. This is the best method, and as large a quantity of blood or tissue (*e.g.*, guineapig brain in old *Spirochaeta hispanica* infections) as possible should be inoculated—up to the total volume of blood [see Sergent's work on *Plasmodium relictum*—this *Bulletin*, 1952, v. 49, 925, 933, 959]. The term " isodiagnosis " is preferable to the more commonly employed " sub-inoculation ".
5. Provocation of a relapse, as in malaria and piroplasmosis. Various methods are used, the most certain of which is splenectomy.
6. Serological or allergic reactions—specific in the case of tuberculosis (Pirquet) etc., and paraspecific in the case of syphilis (Bordet-Wassermann) or malaria (Henry).
7. Changes in the leucocyte count.

P. C. C. Garnham

LEHMANN, H. & SILK, E. **The Prevention of Colour-Fading in the Folin and Wu Estimation of the Blood Sugar.** *Biochem. J.* 1952, Mar., v. 50, No. 5, Proc. Biochem. Soc. xxxi–ii.

In the colorimetric blood-sugar estimation of FOLIN and WU, the colours are subject to considerable fading, particularly in the red part of the spectrum where the major changes in extinction occur and where the measurements are usually made. This fading can be prevented either by (i) chilling the Folin-Wu tubes from the time they have been filled to the mark, until the colour is measured ; or (2) not diluting with water after the molybdate reagent has been added. The former procedure is inconvenient for routine estimations and the latter gives readings too high and volumes too small for some types of colorimeter.

The fading on addition of water is found to be due to the lowering of the phosphoric acid concentration. It may be prevented by filling the tubes to

the mark with a 11·55 per cent. (w/v) solution of phosphoric acid instead of water. In practice, when 12·5 ml. is the usual final volume, one adds to the mixture of 2 ml. substrate and 2 ml. copper tartrate reagent after 6 min. boiling and 1 min. cooling, 3 ml. of the following modified phosphomolybdate reagent : phosphomolybdate reagent of Folin and Wu, 500 ml., phosphoric acid (89 per cent. w/v) 215 ml. ; water 35 ml. The tubes are then filled to the mark (12·5 ml.) with water. The colour is then stable at room temperature. Even on dilution to 25 ml. the fading is less than 5 per cent. in 2 hours.

J. H. Birkinshaw

GURR, George T. [F.R.I.C., F.R.M.S.] **Biological Staining Methods.** 5th Edition. pp. vii + 87, 4 coloured pls. 1952. London : George T. Gurr Ltd., 136, New King's Road, S.W.6. [5s.]

This handbook (the 5th edition in 20 years) opens with notes on the equipment required in staining procedures, observations on the care of stains and other precautions.

There then follow over 50 pages of detailed techniques of staining. All the common methods are given, together with a large number of special techniques. These include staining methods for milk, yeasts, worts and beers, fungi, reticulum, Nissl granules, mucin and glycogen. The Dopa and Feulgen reactions are included. Altogether, over 100 staining methods are described in this section. Six pages are then devoted to histological embedding materials and mounting media and there are special notes on dioxan and on supercedrol (which eliminates the use of absolute alcohol and xylol for cleaning tissues for paraffin embedding and sections for mounting).

An appendix gives some conversion rules and equivalents and it tables the refractive indices of over 30 common reagents, and the solubilities of some 60 stains. The book ends with a formulary of 18 pages and a general index of 6 pages. There are 4 colour plates, clearly illustrating histological stains.

This book should prove invaluable for reference purposes on the bench of any medical or biological laboratory. *H. J. O'D. Burke-Gaffney*

REPORTS, SURVEYS AND MISCELLANEOUS PAPERS

COLONIAL OFFICE. **Colonial Research 1951–1952. Colonial Medical Research Committee. Seventh Annual Report (1951–1952)** [HIMSWORTH, H. P., Chairman] (pp. 103–48). Cmd. 8665. 253 pp. 1952, Sept. London : H.M. Stationery Office. [6s. 6d.]

The Colonial Medical Research Committee has now been in existence for 7 years, and a reader of the report for 1951–52 could hardly fail to be exhilarated at the scope of the work recorded : the report is almost an essay on recent advances in tropical medicine in general.

It is divided into sections. The East African Medical Survey continues, and is carried out by field teams which attempt a complete medical examination of at least one-tenth of the population in the areas surveyed. Research on helminthiasis includes work on *Loa loa* and *Dipetalonema perstans* and their vectors in West Africa. The discovery of breeding places of *Culicoides* in rotting banana stems is a distinct advance, and may be an important pointer to control. Bancroftian filariasis in East Africa, which does not produce a symptom-complex like that of *mumu* in the Pacific, is being studied in East Africa by the Filariasis Research Unit. Guinea worm is being studied in south-west Nigeria, and prevention by construction of deep wells which cannot be contaminated is being extended.

Malaria, of course, receives much attention. In Malaya proguanil resistance has recently appeared for the first time in *P. vivax*, and Daraprim has proved something of a disappointment in acute malaria. Work with residual insecticides indicates that although where they are used parasite rates and spleen rates are eventually reduced to about the same extent as in places where chemoprophylaxis with proguanil is practised, DDT has some irritant effect on vector species, and the numbers of larvae found show no marked change. The chief vector, *Anopheles maculatus*, feeds freely on cattle and other animals besides man. The work on *A.* [*leucosphyrus*] *balabacensis* has been continued in N. Borneo, Sarawak and Brunei, and strong indications continued to be found that the localized clearing of shade is an effective measure of control. Earlier work had suggested that DDT in kerosene repels this mosquito, but this and other work with different insecticides continues.

In the Gold Coast studies of *A. gambiae* have revealed its tendency to feed mainly on adults, and to avoid infants, which is similar to the tendency displayed by some West Indian anophelines ; studies of this kind may throw light on the true reservoirs of malaria in those parts. In Nigeria an attempt has been made to assess the damage to health which may be attributed to malaria ; in the highly endemic areas there seems to be a transient passive immunity for a short time after birth, but malaria appears to have been a direct cause of death in 9 per cent. of infants, 14 per cent. of children aged 1–4 years, 9 per cent. aged 5–7, 4 per cent. of older children, and 2 per cent. of adolescents, in 3,540 children examined at autopsy during the period 1933–50. An eradication scheme in a hyperendemic area, in which BHC residual spray has been used every 3 months since March 1950, shows a spectacular reduction in numbers of *A. funestus* (both adults and larvae) and a slighter reduction in *A. gambiae* ; and a similar spectacular reduction in infectivity of *A. funestus* and a similar less marked reduction in *A. gambiae*. Moreover, although among these people the improvement in parasite rates has been slow, and is hardly noticeable in adults, there has been an increase in live births and a considerable decrease in general and infant mortality. The scheme is costing about 5s. per head of the population per annum.

Studies on various viruses are being carried out at the West African Virus Research Institute, Lagos, and at the East African Virus Research Institute, Entebbe. The rat is probably the natural host of the Mengo virus, and infection of other animals, including man, may be due to accidental contamination of food or water with rat excreta. Detailed studies continue of the vectors of yellow fever in East Africa.

In Malaya work has proceeded on scrub typhus. The discovery has recently been made that Japanese encephalitis occurs in man and horses, and it has been found that leptospirosis is a military problem in jungle work. A repellent (M-1960) [see this *Bulletin*, 1952, v. 49, 1006] has been tested for its action on land leeches, and has been found valuable.

In work on relapsing fever in Africa it has been discovered that whereas in the highlands of Kenya *Ornithodorus moubata* strongly favours man as a source of blood, on the coast it favours the domestic fowl equally strongly.

Physiological investigations have been continued in Uganda, where they have been combined with nutritional enquiries, whereas in Nigeria they have dealt rather with the problems of heat and humidity, especially in relation to mining.

Leprosy has recently proved a stimulating study and work on the new drugs has been pressed ; a dose of 50 mgm. DDS each day, and a blood level of 0·2 mgm. per cent., have been found therapeutically active ; but for full effect higher doses are preferred. ACTH and cortisone have their limited but valuable place in treatment, especially in sensitization to sulphones and in

drug fever, dermatitis, hepatitis, etc., and cortisone eye drops are very useful in certain lesions of the eye.

The nutrition work which has been done in the Gambia is most interesting. Protein deficiency is common and children show low output of nitrogen in the urine, even for weeks after improvement of the diet and control of malaria. Much nitrogen is lost in the faeces because the pancreas fails to secrete proteolytic enzymes in adequate amount ; the initial fault is probably inadequate supply of protein for the synthesis of pancreatic enzymes. Malaria control has a bearing on nutrition, and residual insecticidal spray applied over a period of one year led to increase in haemoglobin, decline in signs of deficiency disease, and reduction of the loss of weight which usually occurs in the "hungry season". Mortality from malaria has been reduced since treatment with only small doses of chloroquine was instituted. Infants given small prophylactic doses from birth are in much better condition than infants who do not receive it.

This report ends with a brief statement of some of the research work which has been undertaken and financed by the governments of various colonies, and this serves as a reminder that the colonial research eggs are by no means all in one basket.

[As is fitting in an account of such excellent work, the report is well and clearly written, but *Hepatocystis* and *Hepatocystes* (p. 117), and *Ornithodorus* and *Ornithodoros* (pp. 131, 132) in adjacent paragraphs will not do, and it is a long time since *Wuchereria bancrofti* was *Filaria bancrofti* (p. 119).]

Charles Wilcocks

East Africa High Commission. **East African Medical Survey. Departmental Annual Report No. 3, 1951** [Laurie, W., Director]. 76 pp., 3 charts. [19 refs.]

The aims of this Unit are to obtain a picture of the states of disease existing in as many areas of East Africa as possible, and to investigate methods of control of the important diseases. The methods of working in each area are to obtain pictures of the state of parasitization of the people and of the incidences of the more important diseases, to investigate the causes of disease, and to conduct "pilot" control trials.

In estimating the incidence of disease, the following methods are used :— laboratory investigations, particularly haemoglobin levels and Kahn reactions ; physical examination, *viz.*, heights, weights, blood pressures, state of nutrition ; dispensary records ; vital statistics ; dietary surveys.

The survey project is working in four areas :—

(a) Mwanza, Tanganyika.
(b) Ukara Island, in Lake Victoria.
(c) Bukoba, Tanganyika.
(d) Kwimba, Tanganyika.

Mwanza Survey.—The work is limited to laboratory investigations on hospital patients. The degree of parasitization has been analysed and the results tabulated according to sex and age-group. Included are the incidences of hookworm, *S. mansoni*, *Entamoeba coli*, malaria, *S. haematobium*, and *W. bancrofti*. Association of infections are noted, *e.g.*, *Ascaris* and *Trichuris*, *S. mansoni* and *Strongyloides*, hookworm and *S. haematobium*, and *E. coli* and other infections. Agglutination reactions for many organisms were carried out on persons admitted to hospital with fever which did not react to anti-malarial drugs. The results indicated the presence of certain of these infections which, because of inaccuracy of the clinical diagnosis, have been regarded as rare.

Also analysed statistically are the haemoglobin levels of hospital patients in relation to infection, tabulated according to sex and haemoglobin content. Analysis of haemoglobin content in relation to numbers of hookworm ova in stools is demonstrated in graph form. Observations on haemoglobin of African infants in the first year of life are also summarized in graph form in respect of infants with and without palpable spleens.

Ukara Survey.—Laboratory results for the degree of parasitization have not yet been analysed but a table is given of incidence of protozoa and helminths according to age and sex. Details are given of haemoglobin levels, Kahn reactions and dispensary records. A detailed dietary survey explains the sources of carbohydrate and protein foodstuffs, and the methods of storage and preparation of food and beer.

An interesting note is provided on the animal husbandry on the island and its effect on the diet of the inhabitants.

" Pilot " control schemes have been instituted for filariasis and ascariasis. A small group of persons has been Mantoux-tested for tuberculosis, and 5 pages of notes on the general problem of tuberculosis in the African are given, bearing in mind the possibility of the use of BCG.

Bukoba Survey.—Like Mwanza, Bukoba is a township on Lake Victoria. Only a limited amount of survey work has been done to date, but two interim reports are given on the amount of venereal disease and the vital statistics of the people. The pattern of fertility, the mortality in children, and reproduction are discussed. The maternity histories of Bukoba women are tabulated in detail.

The Kwimba survey is not yet advanced enough for inclusion in the Report.

For future work, a sampling plan for investigation of disease incidences is briefly described. [A report of this nature is essentially a mass of figures and it is not possible to quote any of these results out of context in a brief abstract.] *R. Ford Tredre*

CONGO BELGE. Rapport Annuel de la Direction Générale des Services Médicaux —1951. [**Annual Report of the Medical Directorate General, 1951**] 124 mimeographed pp., 1 chart. [1952.]

This report opens with a statement of the staff position and records a satisfactory increase of trained persons, including 25 new doctors. There is given an account of the various medical establishments, including teaching centres. This is followed by the usual vital statistics.

Among the diseases listed there may be noted 30 cases of *plague* in Lake Albert region (27 fatal) and 4 fatal cases in the Lake Edward area. The 3 recoveries in the first group are attributed to early diagnosis and treatment with streptomycin and sulphadiazine—it appears that this was the first successful treatment of confirmed cases of plague recorded in the Belgian Congo. Only one case of *yellow fever* was reported during the year. There were 2,524 cases of *smallpox* with 17 deaths : some $1\frac{3}{4}$ million persons were re-vaccinated. There were 70 cases of *epidemic typhus* in Europeans (2 fatal) and 135 (6) in Africans. *Cerebrospinal meningitis* occurred in 148 Africans (60 deaths) and 6 Europeans (2).

There were 199 cases of *trachoma* in Africans and 4 in Europeans. It is recorded that *leptospirosis* (*L. icterohaemorrhagiae*) was reported for the first time since 1941 : there were 28 cases in Africans with no deaths. *Infectious hepatitis* occurred in 1,176 Africans (56 deaths) and 83 Europeans (1) : there had been less than 100 cases in Africans in each of the previous 4 years. *Poliomyelitis* attacked 14 Europeans and 447 Africans : 27 of the latter died.

It is stated that half the population of the Belgian Congo harbour *malaria* parasites : but encouraging results are following the use of modern methods of control, especially in urban areas. Large-scale spraying by helicopters in pilot areas are producing favourable results. There were 10 deaths among 3,249 cases of malaria in Europeans, giving a mortality rate of 0·30 per cent. : the figure in Africans was 0·28 per cent.

The cases of and deaths from *blackwater fever* in Europeans and Africans respectively were 36 (3) and 51 (4). It is stated that infected areas of *sleeping sickness* and the index of new infections are decreasing as a result of the methods employed to control the disease. Some 6 million people are constantly under survey. The index of new infections was 0·09 compared with 0·11 in 1950 and 0·15 in 1949. Pentamidine prophylaxis is widely employed. The usual detailed figures are given and the number of persons given treatment at medical centres and by mobile units was 31,183.

Increasing interest is being given to the control of *tuberculosis*. Mass radiography units operate and BCG vaccination has been given to 100,000 persons every year since 1948. No accidents were recorded and it is stated that the use of BCG " *s'est révélée efficace* ".

The provisions for treatment and control of *leprosy* are shown in great detail : there were 8,925 new cases and 1,018 deaths during the year.

Amoebic dysentery occurred in 636 Europeans, with no deaths : in Africans, there were 9,763 cases with 150 deaths. There was the usual large number of helminthic diseases. It is, however, noted that while *S. haematobium* and *S. mansoni* infections in Europeans were respectively 4 and 67, compared with 6 and 89 for 1950, the figures in the case of Africans were 2,277 and 14,407 compared with 878 and 8,746 in 1950, although the number of deaths was 36 in both years. No comment is made on this large increase in recorded cases of schistosomiasis. A similar large rise is recorded in *filarial* infections, as the following table shows.

	O. volvulus	*Loa*	*W. bancrofti*	*D. perstans*	*Others*
European 1950...	1	59	—	2	169
1951...	66	92	20	30	139
African 1950...	876	888	6	57	7,601
1951...	3,168	1,467	422	892	3,790

There is no comment on this either, nor on the increase of recorded cases of *tropical ulcer* in Africans from 18,481 to 43,120. There were 3 cases of rabies in Europeans and 47 in Africans—presumably suspected cases, as only 1 and 10 deaths are recorded.

The remainder of this section of the report and much of that which follows contains the usual detailed statistical tables. The report also records an account of the various " para-State " and philanthropic bodies, of the medical establishments and of general sanitation, including mosquito control. [For the 1950 Report, see this *Bulletin*, 1952, v. 49, 328.] *H. J. O'D. Burke-Gaffney*

SMITH, P. W. & SMITH, H. M. Notas sobre algunos anfibios y reptiles colectados en el Estado de Chiapas. [**Notes on Amphibians and Reptiles Collected in the State of Chiapas**] *An. Inst. Biol.* Mexico. 1951, v. 22, No. 2, 557–64.

i. MAY, J. M. **Map of the World Distribution of Malaria Vectors.** Reprinted from *Geographical Rev.* 1951, v. 41, No. 4, 638–9, 4 coloured maps on folding pl.

ii. ——. **Map of the World Distribution of Dengue and Yellow Fever.** *Ibid.* 1952, v. 42, No. 2, 283–6, 5 coloured maps on folding pl.

i. This map, which is really four maps in colour on one sheet measuring 3 feet by 2 feet, is the third in the American Geographical Society's "Atlas of Diseases". The author is the head of the Society's Department of Medical Geography and hopes in time to produce a whole atlas on malaria alone comprising several dozens of maps. In the meantime, these four maps show the distribution of more than 50 species of *Anopheles* which are vectors of malaria, and the distribution of the parasites. But the reader should ask, What are the significant species in this particular region and not What is the geographical extension of this particular species? The two world maps are on Briesemeister's elliptical projection with scales of 1 : 50,000,000 and 1 : 100,000,000 respectively; the mosquito map shows also the approximate limit in the northern hemisphere of anophelism without malaria. The other two maps on this sheet are of Africa and Southern Asia; these are on the azimuthal projection and show the distribution of *Anopheles* species of purely local importance. As these maps are coloured, the symbols recommended by the Malaria Conference of the World Health Organization are not used, because they were intended for black-and-white maps.

ii. The second sheet is the fifth in the Society's "Atlas". On it there are 5 maps, including two of the world, one of which shows the distribution of dengue and yellow fever, and the other the distribution of 12 mosquito vectors. Maps of South America and Africa show records of yellow fever immunity by mouse protection tests for man before 1940 and for man and animals after 1940 and a list is given of the places where the tests have been made. Other maps of South America and Africa show where urban and jungle cases of yellow fever were recorded between 1930 and 1951. For comparison, a small key map shows the recorded occurrence of yellow fever between the years 1600 and 1930.

Accompanying both sheets are brief explanatory notes on the purpose of the maps; notes on the respective epidemiologies and on the natural histories of the mosquitoes concerned and a selected bibliography. These maps will be of considerable service to health officers, missionaries, engineers, teachers and others. *H. S. Leeson*

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